Department of the Army
Assistant Secretary of the Army
Research, Development, & Acquisition
Washington, D.C. 20310

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ARMY SCIENCE BOARD
1983 SUMMER STUDY

REPORT OF PANEL
ON
THE FUTURE DEVELOPMENT GOAL

NOVEMBER 1983

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

6 DEC 1983

Attached is the report of the Army Science Board 1983 Summer Study panel on The Future Development Goal.

This study examines The Future Development Goal of the U.S. Army, defined as creation of an environment that encourages innovation and is receptive to new approaches. The study focus is on the concepts of AirLand Battle 2000, emphasizing offensive-minded, highly maneuverable forces. The review discusses issues and specific recommendations in the areas of fighting, equipping, manning and training, including consideration of joint action with other Services.

Amoretta M. Hoeber
Principal Deputy Assistant Secretary of the Army
(Research, Development and Acquisition)

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This study examines The Future Development Goal of the U.S. Army, defined as creation of an environment that encourages innovation and is receptive to new approaches. The study focus is on the concepts of AirLand Battle 2000, emphasizing offensive-minded, highly maneuverable forces. The review discusses issues and specific recommendations in the areas of fighting, equipping, manning and training, including consideration of joint action with other Services.

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FOREWORD

This document constitutes the final report of the Army Science Board 1983 Study of The Future Development Goal. As defined by LTG James H. Merryman during the 8-9 November 1982 meeting of the Army Science Board in San Francisco, the intent of the Future Development Goal is "to create an environment that encourages innovation and is receptive to new approaches".

The recommendations of this report encompass a broad range of suggested actions relating to fighting, equipping, manning and training the Army of the future.

TASKING LETTER

The Army Science Board (ASB) 1983 Summer Study of The Future Development Goal was planned in accordance with the Tasking Letter excerpted below; the complete Tasking Letter is presented on p. 106.

As noted, a broadly-based study of innovative approaches was requested, emphasizing a fresh assessment of Army plans for the foreseeable future.

14 JANUARY 1983

DR. RICHARD A. MONTGOMERY
CHAIRMAN
ARMY SCIENCE BOARD

DEAR DR. MONTGOMERY:

...INNOVATIVE APPROACHES ARE SOUGHT IN FUNCTIONAL AREAS OF DOCTRINE, FORCE STRUCTURE, MANNING, TRAINING, EQUIPPING AND MOBILIZING....

...MY VIEW OF THE OBJECTIVES OF THIS STUDY ARE (1) TO DEVELOP IDEAS AS TO HOW THE ARMY CAN NURTURE AN ENVIRONMENT AT ALL LEVELS WITHIN WHICH INNOVATIVE PERSONNEL CAN LOOK TOWARD THE FUTURE, AND (2) TO MAKE A FRESH ASSESSMENT OF WHERE THE ARMY SHOULD BE HEADED IN ALL OF THE ABOVE FUNCTIONAL AREAS IN THE 21ST CENTURY ....

SINCERELY

AMORETTA M. HOEBER
PRINCIPAL DEPUTY ASSISTANT SECRETARY OF THE ARMY
(RESEARCH, DEVELOPMENT AND ACQUISITION)

PARTICIPANTS

The participants in the ASB Summer Study represented a highly-placed group with broad experience in industry, government and non-profit laboratories.

As noted below and on the following two pages, many additional personnel were involved; the inclusion of Air Force representation is worth special mention, since several of the recommendations relate to improvement of planning, testing and operational interactions with the Air Force.

Exceptionally competent support was provided by the Administrative Staff listed.

ASB SUMMER STUDY
FUTURE DEVELOPMENT GOAL

PARTICIPANTS

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ASB SUMMER STUDY
FUTURE DEVELOPMENT GOAL

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REQUIRED READING LIST

From the syllogism as stated below, it cannot be *logically concluded* that this study is a good study. On the other hand, the two references noted *are exceptional*, and discuss lessons that we should all learn or relearn.

REQUIRED READING LIST

ALL GOOD STUDIES HAVE BIBLIOGRAPHIES OF REQUIRED READING. THIS STUDY HAS A BIBLIOGRAPHY OF REQUIRED READING. THEREFORE -

1. MEN, MACHINES AND MODERN TIMES -

ELTING E. MORISON, THE MIT PRESS, CAMBRIDGE, MA, 1966

CH II GUNFIRE AT SEA: A CASE STUDY OF INNOVATION

2. IN SEARCH OF EXCELLENCE -

LESSONS FROM AMERICA'S BEST RUN COMPANIES,
THOMAS J. PETERS & ROBERT H. WATERMAN, JR., HARPER & ROW, NEW YORK 1982

CH IV MANAGING AMBIGUITY AND PARADOX

"THE TEST OF A FIRST-RATE INTELLIGENCE IS THE ABILITY TO HOLD TWO OPPOSED IDEAS IN MIND AT THE SAME TIME AND STILL RETAIN THE ABILITY TO FUNCTION."

F. SCOTT FITZGERALD

FOCUS FOR FUTURE ARMY DEVELOPMENT

As the focus for the study of The Futur. Development Goal the Army's AirLand Battle and AirLand Battle 2000 concepts – – requiring the Army to see deep and kill deep, and to maintain requisite command, control and communications – – appeared to be entirely appropriate. As LTG Merryman has pointed out, the concepts do not adequately address nuclear conflicts of varying intensity, unconventional warfare or terrorism, but they do represent approaches requiring and permitting the introduction of many forms of innovation.

FOCUS FOR FUTURE ARMY DEVELOPMENT

THIS SUMMER STUDY GROUP'S VIEW OF AIRLAND BATTLE (ALB) AND AIRLAND BATTLE 2000 (ALB 2000) - AS THE FOCUS FOR FUTURE ARMY DEVELOPMENT--

WE CAME AS A DISPARATE GROUP OF CONVERTS, AGNOSTICS, HERETICS, AND UNINFORMED AND DISINTERESTED.

WE LEAVE BELIEVING THAT ALB AND ALB 2000 ARE SUPERB FOCUS FOR THE PROCESS OF EVOLVING AN OFFENSIVE-MINDED, FLEXIBLE, HIGHLY MANEUVERABLE FORCE APPROPRIATE TO THE YEARS 2000 AND BEYOND.

WE ALSO BELIEVE ALB AND ALB 2000 A MOST APPROPRIATE VEHICLE FOR INNOVATION AND YANKEE INGENUITY. IN FACT, CONSIDERING THE CONSTRAINED RESOURCES LIKELY TO BE AVAILABLE TO THE ARMY, IT WILL ONLY BE THROUGH CONSIDERABLE INNOVATION THAT THE FUTURE DEVELOPMENT GOALS OF THE ARMY CAN BE ACHIEVED.

THEREFORE, IT WAS WITH CONSIDERABLE ENTHUSIASM THAT THIS ASB STUDY GROUP PREPARED FOR AND UNDERTOOK ITS PROJECT.

A REVOLUTION IN THINKING

It is evident that the revolution in thinking involved in AirLand Battle 2000 must extend to all aspects of future warfare. In particular, if the concepts of mobility and rapid action are to be successful, the highest levels of coordination with the Air Force are required -- and the various elements of the Army must learn to work still more effectively together. A notable limitation, however, is the need to base future actions on hardware now available or in process of development; furthermore, the necessary innovations in tactical operations must also be evolutionary in character if they are to be successfully introduced without loss of continuity in the ability to fight.

WE FIND THAT AIRLAND BATTLE AND AIRLAND BATTLE 2000 ARE A REVOLUTION IN THINKING

AIRLAND BATTLE AND AIRLAND BATTLE 2000 ARE A REVOLUTION IN THINKING EVEN THOUGH THEY MUST BE ACCOMPLISHED AS AN EVOLUTION OF TACTICS AND HARDWARE

WITH THE AIR FORCE AS AN ESSENTIAL PARTNER THROUGHOUT

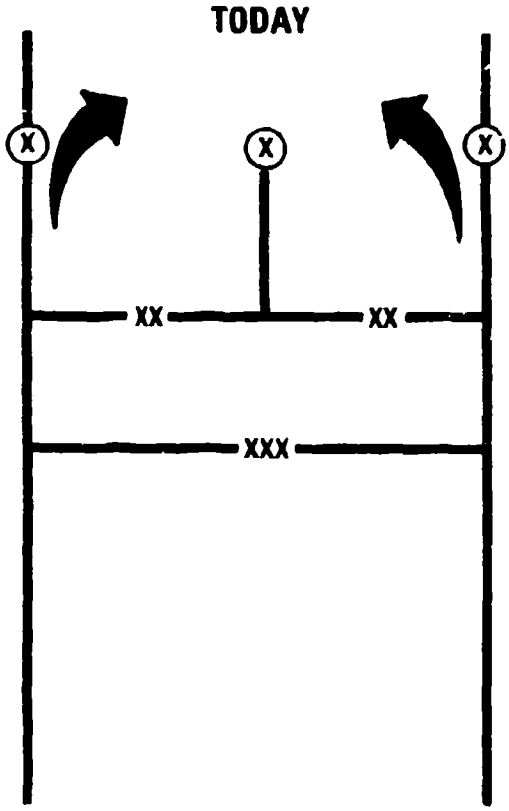
RECOGNIZING THAT ALB 2000 IS A PROCESS, NOT A DOCTRINE (WE THINK OF THE PRODUCT AS A CONSTANTLY CHANGING LOOSE-LEAF NOTEBOOK), THE ARMY MUST ACCEPT THAT IT NEEDS REVOLUTIONARY THINKING FOR THIS REVOLUTIONARY CONCEPT

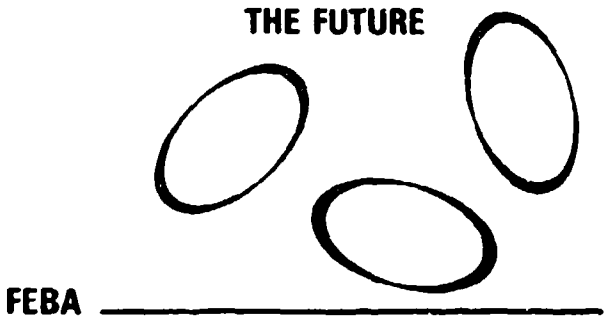
THE CHALLENGE OF AL8 2000
A PROCESS TO GET THERE

In the following sections of this study, the Key Issues indicated below represent the areas of emphasis, and the order in which the results and recommendations are presented.

It should again be emphasized that AirLand Battle 2000 leads to entirely new requirements in terms of mobility and Army action on the enemy side of the previously defined FEBA.

THE CHALLENGE OF ALB 2000
A PROCESS TO GET THERE





KEY ISSUES

- HOW TO LEARN TO FIGHT IN THIS NEW WAY
- HOW DO WE EQUIP TO BEST USE WHAT WE HAVE NOW AND TRANSITION TO WHAT WE NEED IN THE FUTURE
- HOW DO WE PROVIDE THE PEOPLE BEST ABLE TO LEAD AND OPERATE THIS NEW KIND OF FORCE

SUBGROUP ORGANIZATION

In each of the areas of study emphasis, a subgroup was formed as noted below. Beginning in January 1983, numerous individual subgroup meetings and plenary sessions involving all subgroups were held to obtain requisite information, and to develop draft conclusions and recommendations prior to a 15–25 August summarization and writing session conducted at the Woods Hole Study Center of the National Academy of Sciences.

ASB SUMMER STUDY - - FUTURE DEVELOPMENT GOAL SUBGROUP ORGANIZATION

DR. W.B. LABERGE, CHAIRMAN
MR. A.R. EATON, DEPUTY CHAIRMAN

- HOW TO FIGHT

  GEN G.S. BLANCHARD (USA-RET), CHAIRMAN
  DR. S. BONDER
  DR. J.V. BRADDOCK
  MR. L.H. O'NEILL
  GEN J.W. PAULY (USAF-RET)
  DR. J.L. THOMPSON, JR.

- EQUIPPING THE ARMY

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  MR. M.L. LOHR
  DR. T.P. RONA

- PEOPLE IN THE ARMY

  DR. D.F. MCDONALD, CHAIRMAN
  MR. D. SHORE
  DR. H.L. REYNOLDS
  DR. P.P. SIDWELL

NOW IS THE TIME FOR INNOVATION

The summer study relating to The Future Development Goal proved to be exceptionally timely. The confluence of needs with emerging technologies and resulting new tactical possibilities is occurring at a time when resources should become available; a rare opportunity is presented for the consideration and introduction of innovative approaches.

NOW IS THE TIME FOR INNOVATION

MAJOR NEW NEEDS

- MANY AREAS OF POSSIBLE CONFLICT - LESS ASSETS THAN NEEDED FOR CONVENTIONAL SOLUTIONS - EMPHASIS IN EXTENDED MANEUVER - CLEARLY AN AIRLAND BATTLE.

MANY EMERGING TECHNOLOGIES

- SMART SENSORS - INEXPENSIVE, HIGH-POWERED, LOW-VOLUME COMPUTATIONAL POWER HIGH-DENSITY STORAGE - INTERACTIVE DISPLAYS - SATELLITE COMMUNICATIONS.

NEW TACTICAL CONCEPTS POSSIBLE

- OFFENSE-ORIENTED, HIGHLY MOBILE, FLEXIBLE, SMALL TACTICAL UNIT ORIENTATION NOW BECOMING POSSIBLE WITH NEW TECHNOLOGY.

RESOURCES SHOULD BE AVAILABLE

- WE ARE FINISHING THE MAJOR R&D COST OF THIS ROUND OF REEQUIPPING. WE NOW HAVE THE TIME AND RESOURCES TO FIGURE OUT HOW TO BEST USE OUR NEW HARDWARE AND TO DO RIGHT THE NEXT ROUND OF DEVELOPMENT. WE HAVE THE TIME TO FOCUS ON WHAT'S IMPORTANT.

THIS ALB FUTURE DEVELOPMENT GOAL STUDY PRESENTS SOME AVENUES OF INNOVATIVE APPROACH THAT MAY BE IMPORTANT TO THE ARMY. IT IS OUR VIEW THAT IT IS TRULY THE TIME TO APPLY MAJOR EFFORTS TO FINDING CREATIVE PROGRAMS TO PUT YANKEE INGENUITY TO WORK FOR THE ARMY.

ACRONYMS

Acronyms employed in the following sections of this report are listed and defined on pp. 108-113.

FUTURE DEVELOPMENT GOAL

HOW TO FIGHT?

HOW TO FIGHT PANEL

A ML TI-SERVICE PROCESS

The study results and recommendations in this area are presented in accordance with the outline and order noted below.

Integral to the process of fighting in the AirLand Battle 2000 environment is the need for closer Army/ Air Force cooperation; recommendations in this area are therefore highlighted in the first section.

HOW TO FIGHT PANEL

A MULTI-SERVICE PROCESS

- ARMY/AIR FORCE: WARFIGHTING TEAM
- AIRLAND BATTLE 2000
- HUMINT RECONNAISSANCE
- LOGISTIC SUPPORT FOR ALB 2000
- FUTURE CONCEPTS/TACTICS DEVELOPMENT PROCESS
- FIELD INNOVATION FEEDBACK
- REQUIREMENTS DEVELOPMENT METHODOLOGY
- CLOSE COMBAT ASYMMETRIES
- TASK FORCE MANAGEMENT
- COMBINED ARMS TRAINING STRATEGY

ARMY/AIR FORCE: WARFIGHTING TEAM

The current dialogue between Army and Air Force staffs on innovative concepts for prosecution of the joint battle of the future is most encouraging and in our view must continue. To consider future theater warfare as composed of separate and disconnected air and ground entities would be folly and to do so would be perilous. We must further mutual understanding, among soldiers and airmen, of the cause-and-effect relationships which result from air and ground force actions. In this respect, we believe the April 1983 Memorandum of Understanding, signed by the respective Service chiefs, charts the way for the future. Ongoing study efforts aimed at developing joint future concepts and the resulting intellectual process are exciting, challenging, and vital efforts. Regardless of the direction which these studies may take, it is the joint Army/Air Force intellectual process which is a fresh wind of change and which absolutely must continue. To go our separate ways would be a grave disservice to our nation and, indeed, may very well place both services at unacceptable risk in the theater battle of the future.

It is useful to remind ourselves of the alternative to the resolution of important inter-Service issues by those Services: the forfeiture of that responsibility to external agencies such as OSD and/or the Congress. This means the resolution will be imposed by groups often having less professional expertise in these matters than that possessed within the military services involved. This is clearly not desirable.

The recommendations which we offer are self-explanatory and center on means for extending and institutionalizing the process which in the lead paragraph we so heartily endorse. It should be remarked, here, that the last recommendation -- formation of a standing ASB/AFSAB joint committee -- owes part of its inspiration to the thoughtful work accomplished by a forerunner, the ASB/AFSAB Joint Summer Study of 1978 (Tactical Battlefield Systems).

ARMY/AIR FORCE: WARFIGHTING TEAM

ISSUE: HOW TO IMPROVE ARMY/AIR FORCE "JOINTNESS" AS THEY PLAN AND EQUIP TO FIGHT TOGETHER

DISCUSSION:

- RECENT EXAMPLES TO BE APPLAUDED:
  - MOU SIGNED BY TWO CHIEFS
  - ONGOING WORK ON FOCUS 21
- FURTHER INSTITUTIONALIZATION SEEMS DESIRABLE.
- UNDESIRABLE ALTERNATIVE TO CONTINUING ARMY AIR FORCE COOPERATION OSD AS REFEREE

RECOMMENDATIONS:

- ARMY AND AIR FORCE LEADERSHIP CONTINUE TO EMPHASIZE (1) EFFORTS IN RESPECTIVE SERVICES TO DEVELOP JOINT WARFIGHTING TACTICS, TECHNIQUES, AND PROCEDURES; (2) EFFORTS TO CORRELATE SERVICE BUDGETS IN RESPONSE TO MUTUAL WARFIGHTING NEEDS.
- DA AND HQ USAF INCREASE EMPHASIS ON THE USE OF EXERCISES AS A VEHICLE TO TEST AND VALIDATE NEW JOINT WARFIGHTING CONCEPTS AND PROCEDURES.
- CSA APPROACH CSAF TO INCREASE SIGNIFICANTLY (FACTORS OF 3-5): (1) INSTRUCTORS AND ATTENDANCE AT MID-LEVEL PROFESSIONAL SCHOOLS TO PRECLUDE SERVICE MYOPIA; (2) CROSS-SERVICE STAFFING AT THE COMBINED ARMS CENTER.
- CONSISTENT WITH THE RECENT ARMY AND AIR FORCE MOU, SEC ARMY AND SEC AF ESTABLISH AND CHARTER A STANDING ADVISORY PANEL.
  - COMPOSED OF EQUAL NUMBERS OF ASB AND AFSAB MEMBERS
  - CHAIR AND HOST RESPONSIBILITIES ALTERNATING ON AN ANNUAL BASIS
  - PROVIDE A STIMULUS TO THE DEVELOPMENT OF INNOVATIVE APPROACHES TO IMPROVE EXECUTION OF AIR-GROUND OPERATIONS

AIRLAND BATTLE 2000

Army doctrine in the 1960's was based on a linear static defense concept. Motivated by a concern over the "delay to the Rhine" European doctrine after the Vietnam War, the Army moved to more mobile but still defensive fighting concepts (e.g., Active Defense, Central Battle) in the 1970's. The beginning of offensive maneuver concepts emerged in the form of AirLand Battle doctrine in 1970-1982 with initial rationalization for deep attack and synchronization. AirLand Battle 2000 (ALB 2000) reflects the Army's search for new concepts on how to fight and its desire to instill a more offensive attitude in the fighting forces -- an attitude and capability which offer many direct and indirect benefits.

Although ALB 2000 was conceived over 3 years ago, the Army has proceeded with it as a single umbrella concept and with faith in its plausibility and potential effectiveness, but without adequate independent critical review and analysis. Might other concepts be better? Is it operationally plausible for regiments to maneuver (and be controlled by ALF) at a depth of 300-500 km? Is it plausible to deploy to this posture from the European political border in a short war? Are dispersed, deep-roaming regiments a militarily effective means of waging war? Is ALB 2000 unusually vulnerable to catastrophic failure?

Although ALB 2000 is a futuristic concept (albeit not approved) of how the Army will fight in the period 1995-2015, the battle is still heavily dominated by (likely highly vulnerable) heavy maneuver formations, traditional branch structures, and current C^2 staff functions. Since the Army will buy M1, M2, PATRIOT, APACHE, etc., out to 1990-1995, and will keep them in the inventory many years beyond that, ALB 2000 will not drive major materiel developments as intended in the CBRS, but rather will be constrained by current force modernization systems. Examination of the advertised duration from concept formulation (1980 for ALB 2000) to doctrine implementation (1995 for ALB 2000) -- 15 years -- timing of CBRS activities, and lead time for major materiel items suggest that new doctrine may be available for implementation many years before IOC of new materiel to support it.

The concepts of ALB 2000 require joint Service operations over greater distances than those available in any single test/training facility in the U.S. Eventually, these concepts must be field tested. A large number of facilities belonging to Army, Air Force, Navy, and Marines exist in the Southwest and West, from Fort Hood and Bergstrom Air Force Base to National Training Center and Nellis Air Force Base. Some of those facilities are well instrumented and could provide the resource base required to conduct field tests of AL2 2000.

AIRLAND BATTLE 2000

ISSUE: DOES ALB 2000 SUFFICIENTLY MEET THE ARMY'S NEED FOR A FUTURE WARFIGHTING CONCEPT?

DISCUSSION:

- ALB 2000 IS AN IMPORTANT VEHICLE IN MOTIVATING OFFENSIVE MINDSET.
- THE NEED EXISTS TO ASSESS PRELIMINARY PLAUSIBILITY OF REQUIRED OPERATIONAL TECHNICAL CAPABILITIES AND TO RATIONALIZE THE EFFECTIVENESS OF ALB 2000 AND ALTERNATIVES CONCEPTS.
- IF IMPLEMENTED BY 1995-2000, WILL BE PRINCIPALLY WITH SYSTEMS DEVELOPED AND BEING PROCURED UNDER CURRENT FORCE MODERNIZATION PROGRAM -- NOT MANY FROM CONCEPT-BASED REQUIREMENTS SYSTEM (CBRS).

RECOMMENDATIONS:

- TRADOC CONDUCT RUDIMENTARY GAME ANALYSIS IN CONJUNCTION WITH USAF FOR INITIAL ASSESSMENT OF ALB 2000 OPERATIONAL PLAUSIBILITY AND COMBAT EFFECTIVENESS. COMPLETE NLT APRIL 84.
- TRADOC MODIFY INITIAL IMPLEMENTATION OF ALB 2000 TO RECOGNIZE THE CAPABILITIES AND LIMITATIONS OF CURRENT FORCE MODERNIZATION SYSTEMS. ADJUST TARGET DATE FOR FULL IMPLEMENTATION OF THE CONCEPT TO 2010 AND USE AS A BASIS TO DRIVE MATERIEL DEVELOPMENTS.
- DCSOPS LEAD INVESTIGATION OF HOW THE FACILITIES AND RESOURCES OF THE VARIOUS SERVICES CAN BE USED AND MANAGED IN A COORDINATED TIMELY MANNER TO TEST, EXPERIMENT, AND EXERCISE ALB 2000 CONCEPTS AND TACTICS.

AIRLAND BATTLE 2000 (CONT'D)

Although ALB 2000 is not as yet an approved concept, it is a train that has left the station and is rapidly gaining momentum. Accordingly, we believe it is imperative that ALB 2000 be subjected to a critical review in the immediate future. We do not suggest an exhaustive assessment, but rather one that provides preliminary insights into the operational plausibility and military effectiveness of the concept (and alternative concepts if deemed appropriate). Games available at the Army War College, Armed Forces Staff College, and National Defense University could be used today for the analysis. The analysis should involve personnel who are involved in developing the concept. In addition to their value in rational design of the concept, we believe results of the assessment also will be instrumental in obtaining corporate Army agreement on a future concept on how to fight.

ALB 2000 implies significant needs for technical advances such as significant improvements in energy efficiency and ammunition weight and lethality. The nature of probable advances in materials and designs, as well as their likelihood of timely occurrence, requires assessment.

A revised CBRS might recognize three loosely sequential phases relative to doctrine development: approved doctrine is implemented, is constrained by currently fielded systems, and will be in effect for 8–15 years. A "transition doctrine," constrained by the next generation of materiel, should be in the development phase with the intent of replacing current doctrine in 8–15 years. Operational (umbrella) concepts drive the technology base, are used in developing the transition doctrine, and lead to approved doctrine in 15–25 years.

AIRLAND BATTLE 2000

ISSUE: DOES ALB 2000 SUFFICIENTLY MEET THE ARMY'S NEED FOR A FUTURE WARFIGHTING CONCEPT?

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- TRADOC MODIFY INITIAL IMPLEMENTATION OF ALB 2000 TO RECOGNIZE THE CAPABILITIES AND LIMITATIONS OF CURRENT FORCE MODERNIZATION SYSTEMS. ADJUST TARGET DATE FOR FULL IMPLEMENTATION OF THE CONCEPT TO 2010 AND USE AS A BASIS TO DRIVE MATERIEL DEVELOPMENTS.
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HUMINT RECONNAISSANCE

Today, the burden for seeing "deep" -- deeper than a few tens of kilometers -- falls very heavily on SIGINT. The value of this source is unquestioned. What is of concern are two possible enemy responses: (1) application of strict EMCON procedures to reduce information available, and (2) the development of C&D operations exploiting our heavy dependence on this source. Another concern is that tasking of a large portion of SIGINT assets occurs at levels above those of battle commanders, and may not be responsive to their immediate needs. HUMINT assets, assigned and responsive to Corps, alleviate these worries.

It is useful, here, to be more explicit on what we mean by HUMINT. Specifically, what is meant by this term is trained U.S. Army personnel inserted at chosen locations (principal LOCs, bridges, etc.) whose sole functions are to observe and report -- with no combat responsibilities.

Both the screening and the training of these personnel are important to the success of this capability. The Army's Special Warfare Center is uniquely qualified when considering these paired functions: screening and training. Therefore, we recommend that the SWC be tasked to develop a syllabus, consistent with approved doctrine, for such training and initiate such a course in FY 1984.

An element essential to the success of this capability is provision of communications gear designed to reduce, to the extent practicable, the possibilities of detection, interception, and location -- and to field the initial set of this gear quickly. Since "quickly" is the operative word, it is appropriate to seek development and procurement assistance from NSA, an agency which, first, is familiar technically with a number of concepts currently being discussed for such low-probability-of-intercept (LPI) communications gear and, secondly, deals on a routine basis with the development and procurement of small buys of unique equipment.

We have not dealt with the important issues of insertion and extraction.

HUMINT RECONNAISSANCE

ISSUE: HOW CAN THE ARMY IMPROVE ITS HUMINT RECONNAISSANCE CAPABILITY?*

DISCUSSION:

- COMPLEMENT TO SIGINT AND OTHER STANDOFF SENSORS IN SEEING DEEP.
- PROLIFERATION OF SENSOR TYPES DECREASES PROBABILITY OF BEING VICTIM OF SUCCESSFUL C&D OPERATIONS.
- HUMINT MISSION: INTELLIGENCE ONLY.

RECOMMENDATIONS:

- TRADOC TASK SWC WITH RESPONSIBILITY FOR DEVELOPING A HUMINT RECONNAISSANCE COURSE.
  - TRAIN CORPS AND EAC PERSONNEL FOR THIS MISSION.
  - START DATE FOR FIRST COURSE SHOULD FALL IN FY 1984.
- DA FIELD COMMUNICATIONS GEAR SUITABLE TO THIS MISSION. FOR THIS TASK SWC SHOULD ESTABLISH REQUIREMENTS. DA REQUEST NSA DEVELOP AND PROCURE INITIAL SET OF COMMUNICATIONS GEAR. FIELD DATE SHOULD BE FY 1985.

* HERE HUMINT IS NARROWLY DEFINED AS RECONNAISSANCE ACTIVITIES PERFORMED BY U.S. MILITARY PERSONNEL INSERTED BEHIND ENEMY LINES TO SUPPORT COMBAT OPERATIONS.

LOGISTIC SUPPORT FOR ALB 2000

Providing Combat Service Support (CSS) to regiments in ALB 2000 rests on a group of assumptions which have not been fully described or evaluated for practicality. In 1995 and for 10 or more years thereafter, many, possibly most, weapons systems in the Army will be those now (1983) deployed or in engineering development. Nevertheless, logistical planners for ALB 2000 require substantial alleviation of demand for ammunition, POL, and other supplies. No explanation has thus far been presented of how this alleviation is to be achieved. Indeed, substantial increases in the logistical burden seem likely to result from ALB 2000 since regiments are conceived as requiring sustainment for increased periods in fighting of great intensity.

Avoiding severe restraints on combat operations resulting from limits on CSS capabilities cannot be assured by any straightforward means. Improved technology will do little by 2000 to decrease demand.* By 2020-2030 substantial decreases in demand are possible. However, new CSS techniques and equipment (not yet defined) will be needed if significant restrictions on regiment maneuver, flexibility, and ability to function independently for several days are to be avoided.

It seems likely that new air and ground vehicles for CSS units will be needed. These will have to be reliable, survivable, and flexible in modes of operation. Conception and description of such new CSS vehicles have not yet started. If ALB 2000 as now conceived is actually to become doctrine early in the next century, it is already very late to begin conceiving new CSS vehicles and other systems.

For practical purposes, no description of the relationship of the Navy to ALB 2000 exists, even though there are many potential locations of combat in which Navy participation will be essential.

The fundamental role of CSS in future modes of combat seems to be inadequately recognized. Logisticians have basic, essential contributions to make to ALB 2000, or to any operational concept. Their presence and influence in concept development teams should be strengthened. DA should fund the Log Center and encourage R&D by the Center to improve the ability of logisticians to play an enlarged role in the development of CBRS.

* A possible exception would occur if use of COPPERHEAD and "Smart Munitions" generally could be standard for artillery used in combat based on ALB 2000. This could happen by the year 2000 and might reduce needed ammunition weights by a factor of 3 to 5. No major reduction in POL demand by year 2000 can be expected.

LOGISTICS SUPPORT FOR ALB 2000

ISSUE: CAN ALB 2000 BE LOGISTICALLY SUPPORTED? CAN PRACTICAL TECHNOLOGY PROVIDE ALB 2000 LOGISTIC SUPPORT?

DISCUSSION:

- CSS IS WEAKEST LINK IN ALB 2000.
- ABSENCE OF BASIC ANALYSIS TO EXAMINE PLAUSIBILITY OF CSS CONCEPT - NO ESTIMATE OF DEMAND
- SMALL (~10-20%) REDUCTION OF POL WEIGHTS AND VOLUMES ARE BEST THAT CAN BE ACHIEVED BY YEAR 2000.
- POSSIBLE MAJOR REDUCTION OF AMMUNITION TONNAGE BY YEAR 2000 IF "AREA" AND "SMART" MUNITIONS USED IN ALB 2000.
- LARGER REDUCTION, ~50%, IN POL; ~80% IN AMMUNITION, MAY BE ACHIEVED BY 2020-2030.
- NO DESCRIPTION OF USN AND USAF ROLE IN LOGISTICS.

RECOMMENDATIONS:

- TRADOC DESCRIBE HOW REGIMENTS ARE TO BE SUPPORTED AND VALIDATE DESCRIPTION BY ANALYSIS. EFFORT COMPLETED BY APRIL 84.
- TRADOC BETTER INTEGRATE LOGISTICS (INCLUDING USAF, USN, AND ARMY COMBAT ARMS PARTICIPATION) INTO ALB 2000 EFFORT.
- DA CONTINUE RECENT EMPHASIS TO PROVIDE APPROPRIATE PERSONNEL AND R&D FUNDING TO LOG CENTER.
- CSA SEEK CNO AND CSAF SUPPORT FOR NAVY AND AIR FORCE PARTICIPATION IN ARMY EFFORT TO REFINE CSS/LOG CONCEPTS FOR ALB 2000.

FUTURE CONCEPTS/TACTICS DEVELOPMENT PROCESS

The Army has implemented a formal process for creating future operational concepts (umbrella and functional area) leading to the development of next-generation doctrine and tactics. Although the formal process is sound in principle, it is not preferentially staffed with innovative personnel (innovative requirements far exceed the number of innovators) and lacks the continuity and critical mass of full-time personnel immersed in the problem sufficiently to create innovative and effective tactical concepts. The umbrella concept serves as the critical first step in the Concept-Based Requirements System (CBRS) which drives the development of force design, materiel, and training requirements. However, the formal process is hierarchically layered and production oriented to the point that it encourages acceptance of a single tactical concept without adequate inquiry into alternatives, concept plausibility (operational and technological), combat effectiveness, and future uncertainties (threat, technological, political).

The intent of forming a separate, advanced concepts and tactics group is to assemble a continuing critical mass of full-time, self-motivated, quality thinkers immersed in "tactical science," but experienced in military operations, and dedicated to the mission of inventing and advocating new concepts and tactics for the Army of the future. It is important that this be viewed as, and in fact be, a professionally rewarding and beneficial assignment. The group reports directly to the TRADOC Commander (the individual responsible for new tactics/doctrine development) and is unencumbered by the writing of manuals, "responding to fires," and to the many needed production activities associated with developing and implementing doctrine. Although details are to be worked out by the TRADOC Commander, we envision the group comprising 15-20 selected, primarily field grade, individuals serving at most 3-year tours which are appropriately phased for continuity of effort. Some related functions include: identify problems and invent solutions for integration of tactics, organizations, and weapon systems for doctrine; assemble and maintain quantitative and qualitative knowledge base for concept/tactics development; using Army analysis resources, responsively and early in the process, analyze and evaluate alternative concepts/tactics for plausibility, effectiveness, and robustness; actively seek out tactical innovations of field units; analyze NTC data for tactical lessons; and at the discretion of the commander, responsively address pressing conceptual/tactics issues.

FUTURE CONCEPTS/TACTICS DEVELOPMENT PROCESS

ISSUE: HOW CAN THE ARMY IMPROVE THE FUTURE CONCEPTS AND TACTICS DEVELOPMENT PROCESS?

DISCUSSION:

- THE CONCEPT-BASED REQUIREMENTS SYSTEM (CBRS) IS A QUANTUM JUMP FORWARD. THE FORMAL SYSTEM IS SOUND IN PRINCIPLE.
- CONCEPT DEVELOPMENT IS THE CRITICAL FIRST STEP IN CBRS AND DOCTRINE DEVELOPMENT.
- CONCEPT DEVELOPMENT PROCESS SHOULD BE MODIFIED TO STIMULATE AND TAKE BETTER ADVANTAGE OF INNOVATIVE AND CREATIVE THOUGHT.
- THE PROCESS MUST ENCOURAGE CONSIDERATION OF VIABLE ALTERNATIVES, EVALUATION OF CONCEPT PLAUSIBILITY AND COMBAT EFFECTIVENESS, AND CONSIDERATION OF FUTURE UNCERTAINTIES.

RECOMMENDATION:

- TRADOC ESTABLISH ADVANCED CONCEPTS AND TACTICS GROUP, REPORTING DIRECTLY TO CG, TRADOC, FOR INVENTION AND ADVOCACY OF NEW TACTICS. IT IS INTENDED THE GROUP CONTAIN A CRITICAL MASS OF DEDICATED THINKERS CONDUCTING 6.2-TYPE ACTIVITIES ON FIGHTING CONCEPTS, TACTICS, AND DOCTRINE.

FIELD INNOVATION FEEDBACK

Over the next decade the Army will implement the largest force modernization program in its history. It generally takes 5-7 years to learn to use effectively new systems which differ in degree from those of prior generation (e.g., M-1 Tank, DIVAD). It will take significantly longer to develop innovative and effective tactics and procedures for new systems which differ in kind (e.g., ASAS, CSWS, SIGMA). Fortuitously, the Army in the field is continually innovative as unit commanders and troops exercise and experiment with new systems. Typical examples include: SOTAS use in REFORGER '78, MARNE Division M1 use in REFORGER '82, V Corps and HTLD distributed CP, and micro-computer applications in V and VII Corps.

What is needed is an innovative feedback process to identify good ideas by field units and responsively make them known throughout the Army. TRADOC, FORSCOM, and USAREUR have developed a feedback system. This is a formal feedback system which is passive in nature (i.e., the innovator initiates the feedback). Discussions with USAREUR, TRADOC, and AFSTAF personnel suggest that the system is not yet working -- most innovations go unreported, others get lost in the process. We believe the feedback must be active, informal, and non-hierarchial.

As the MACOM responsible for the development of doctrine, tactics, and procedures for the Army, TRADOC should initiate more active, informal exchanges with field units, including NTC, for innovations in tactics. This could be accomplished by the proposed TRADOC commander's group on advanced concepts and tactics. The New Organization Training Team (NOTT) offers an additional avenue. NOTT was a TRADOC initiative to which USAREUR and FORSCOM agreed. Original purpose: to assist in unit one-time transition to Division 86 and set stage for integrating approved doctrinal publications and personnel trained in new doctrine. Schools and Centers provided assets and support. After Action Reporting indicates TRADOC and school system "got as much as it gave." The NOTT activities could be continued on an annual basis in order to provide an active feedback of field innovations directly to the TRADOC Schools.

For most of the past two decades the Army analysis community has devoted essentially all of its resources to analyses related to force modernization. At this time, and for the next 10-15 years, there will exist a near-parallel situation in the field to that which prevailed in World War II for the operations researchers. There will be a rapid introduction of new, complex military technology in the hands of forces lacking any experience in its use. The raison d'etre of the ops analyst in World War II in working with military personnel was as a principal translator of technology into effective operational employment. The time is now right to shift the emphasis of analysis activity from the long range planning issue of "what is needed for the future" to address the more operational one of "how to use what we have." Although field units are inherently innovative with new systems, we believe this phenomenon could be enhanced and the cross-unit exchange facilitated through the establishment of a "tactics team" of analysts assigned to each division. The team would work with assigned personnel in the development of tactics and facilitate cross-unit exchange with other tactics teams. The team would consist of 3-5 analysts drawn from existing Army ORSA Agencies (TRASANA, CAA, AMSAA, etc.) on two-year field assignments.

FIELD INNOVATION FEEDBACK

ISSUE: HOW CAN THE ARMY IMPROVE ITS MEANS TO IDENTIFY, SCREEN, AND IMPLEMENT FIELD INNOVATIONS ON "HOW TO FIGHT"?

DISCUSSION:

- TAKES YEARS TO LEARN TO USE A NEW SYSTEM EFFECTIVELY.
- ARMY "IN THE FIELD" IS CONTINUALLY INNOVATIVE AS COMMANDERS AND TROOPS EXERCISE AND EXPERIMENT WITH NEW SYSTEMS. (INNOVATION IN THE FIELD IS ENCOURAGED -- IT MAKES EVERYONE'S JOB EASIER. IN THE STATESIDE PLANNING PROCESS THIS IS NOT THE CASE.)
- FORMALIZED FEEDBACK SYSTEM IS A PASSIVE SYSTEM THAT IS NOT YET WORKING EFFECTIVELY -- MOST INNOVATIONS GET LOST IN THE PROCESS.
- FEEDBACK PROCESS MUST NOT BE HIERARCHICAL.

RECOMMENDATIONS:

- TRADOC AND OTHER MACOM'S INITIATE MORE ACTIVE INFORMAL EXCHANGE WITH FIELD UNITS, INCLUDING NTC, FOR INNOVATIONS IN TACTICS.
- DA SUPPORT ESTABLISHMENT OF A "TACTICS TEAM" OF ANALYSTS IN EACH DIVISION TO ASSIST IN THE DEVELOPMENT AND EXCHANGE OF INNOVATIVE TACTICS, TECHNIQUES, AND PROCEDURES (INFORMAL CROSS-UNIT LINK). EACH TEAM WOULD CONSIST OF A SMALL CADRE OF QUALITY ANALYSTS DRAWN FROM EXISTING ARMY ORSA AGENCIES FOR 2-YEAR FIELD ASSIGNMENTS.

REQUIREMENTS DEVELOPMENT METHODOLOGY

The current procedure for developing requirements for materiel, training devices, force structure, etc., flows from the Concept-Based Requirements System which is built around mission area analysis. The current mission area analyses are organized along fairly singular technical and military operational disciplines. The probable improvements in combat effectiveness offered by better and broader combined arms and logistics integration should be recognized in the requirements process. The process in use today (doctrine development based on concepts) is valid and should be retained. The procedure for developing requirements can be and should be modified.

The recommendation made here is that mission area analysis be "tailored" to particular situations. Given that integration of arms and services is key to combat effectiveness, the mission area analysis should be conducted by a task force of appropriate experts, not by a single proponent. Task force participants should include all branch and discipline elements needed for efficient definition of the desired combined arms solution and to express the corresponding requirement fully and clearly. A lead participant (possibly using the "rotating chair" approach) should be designated to produce the MAA.

Not all MAAs need be done as described above. Some MAAs could remain functional. Some should involve the other Services. Examples might be the Air Force (even taking the lead) for the AirLand Deep Battle. A TNF overwatch MAA might involve the Navy because of its diversified cruise missile platform force.

In summary, requirements should flow from the best possible mix of combined arms and Service contributors. MAA production should be led by a major contributor and should be supported by others with significant interest and knowledge.

REQUIREMENTS DEVELOPMENT METHODOLOGY

ISSUE: HOW CAN THE ARMY IMPROVE ITS REQUIREMENTS DEVELOPMENT METHODOLOGY?

DISCUSSION:

- CURRENT CONCEPT-BASED REQUIREMENTS SYSTEM IS APPROPRIATE FOR FORCE DEVELOPMENT NEEDS, BUT REQUIRES MORE EMPHASIS ON CSS.
- CURRENT METHODOLOGY IS BASED ON FUNCTIONAL ASSESSMENTS (MAA'S).
- FUTURE COMBINED ARMS INTEGRATION WILL BLUR CURRENT FUNCTIONAL CATEGORIES.
- HORIZONTAL ASSESSMENTS ARE NEEDED TO EXAMINE FULLY ARMY WARFIGHTING NEEDS. ONE EXAMPLE COULD BE:

ASSESSMENT	LEAD*
• HOW TO FIGHT MAA - (UMBRELLA)	- FT LEAVENWORTH
• CLOSE COMBAT MAA	- FT KNOX OR FT BENNING
• CONCURRENT DEEP BATTLE MAA	- FT SILL OR USAF
• CONCURRENT REAR BATTLE MAA	- FT LEE OR FT McCLELLAN

- EACH MAA HAS FULL PARTICIPATION FROM ALL ARMY FUNCTIONAL AND SPECIALTY AREAS, THEATER COMMANDS, AS WELL AS NAVY, MARINE, AND AIR FORCE PARTICIPATION

RECOMMENDATION:

- TRADOC ASSESS CAPABILITY AND DEVELOP REQUIREMENTS USING MIXED GROUPS OF MAA PARTICIPANTS AND INCLUDE THIS MECHANISM IN THE CBR PROCESS.

* CONSIDER COMBINED LEAD WITH ROTATING CHAIR

CLOSE COMBAT ASYMMETRIES

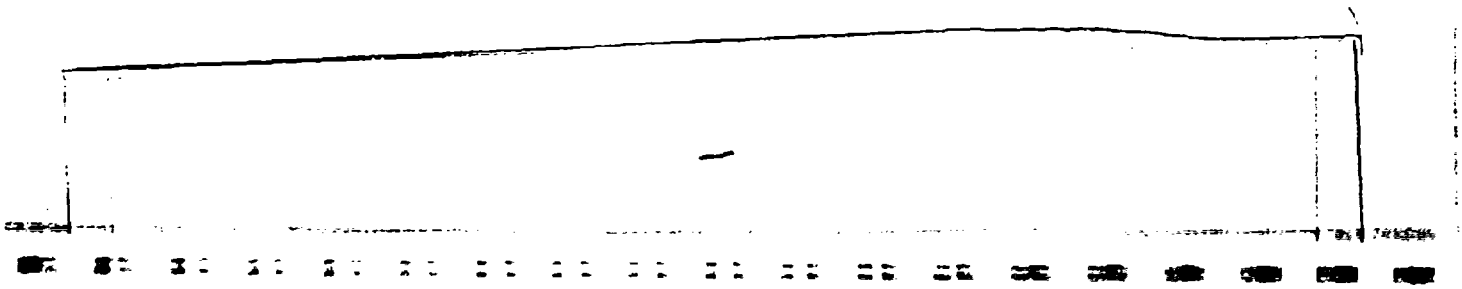
The Army formally organizes its combat elements at battalion and higher levels of command. In actual operations and in exercises, informal task organizations and integration take place at company level and below. Mechanized and armored platoons are typically integrated into company combined arms teams.

In conflict with some opponents, notably the Soviet Union, advantageous asymmetries could be created. Decentralized operations produce many more "clusters" to be suppressed by artillery, air, or even chemical or nuclear means. This dilutes a major Soviet advantage in artillery because of their structure and methodology. To date, the Soviets have been unable to integrate combined arms below regiment even though the motorized rifle battalion has a combined arms character. This condition seems to be a by-product of both their society, which inhibits initiative, and their top-down command philosophy, which places great flexibility at the top and becomes progressively more rigid further down in the organization.

Currently implemented and planned modernization offers the opportunity for more diverse combined arms teams, and could lead to more decentralized, better "massed" operations. Because of multiple arms available, better synchronized combined arms operations implemented with greater decentralization of command and greater dispersal could lead to greater survivability and higher engagement rates. This should produce both swifter execution of maneuver and higher kill rates. Field units are in the best position to explore innovation mixes. Data could be made available to TRADOC for evaluation through expanded fielding and use of MILES equipment (particularly if an acceptable artillery version can be developed).

There are other benefits, which have their own values, flowing from both decentralization and diversity. Specialized, smaller combined arms and diversified teams could provide unique capabilities and high leverage. An example used for illustration is the following:

> Local air defense suppression in support of fixed- and rotary-wing aircraft by a team composed of a helicopter or a fixed-wing aircraft and an MLRS or artillery battery.
>
> The advantage here would derive from sensors on the aircraft localizing (to 100 to 200 meters) gun and missile air defense systems. The coupling with artillery systems would be direct. The munitions employed would be area munitions which would not only destroy the radar, but missiles, launchers, support personnel, and vehicles as well. Air defense sites would be eliminated rather than neutralized.



CLOSE COMBAT ASYMMETRIES

ISSUE: AT WHAT LEVEL AND IN WHAT COMBINATION SHOULD THE ARMY ORGANIZE COMBINED ARMS TO MAXIMIZE COMBAT EFFECTIVENESS VIS-A-VIS SOVIET FORCES?

DISCUSSION:

- SOVIET SOCIETAL CONSTRAINTS AND C^2 PHILOSOPHY HAVE, TO DATE, LIMITED THEIR ABILITY TO BOTH INTEGRATE COMBINED ARMS AND DECENTRALIZE EXECUTION.
- WE SHOULD FOCUS ON CREATING AND TAKING ADVANTAGE OF MAJOR ASYMMETRIES BETWEEN OURSELVES AND THE SOVIETS.
- INNOVATIVE COMBINED ARMS INTEGRATION MIGHT YIELD SUBSTANTIAL SURVIVABILITY ADVANTAGES AND IMPROVE EXECUTION SYNCHRONIZATION AND SYNERGISTIC BENEFITS.
- MILES OFFERS UNIQUE CAPABILITIES TO EXPLORE AND EVALUATE INNOVATIVE TECHNIQUES/ORGANIZATIONS.

RECOMMENDATIONS:

- TRADOC DESIGN COMBINED ARMS ORGANIZATION IN SMALL FORCE UNITS AND ASSESS THEIR MILITARY VALUE. EXAMPLES INCLUDE ARMOR - INFANTRY - ARTILLERY MIXES IN UNITS: VARIATIONS OF ARMORED CAVALRY STRUCTURE.
- TRADOC EXPLORE NEW AND PROMISING COMBINED ARMS TACTICS, TECHNIQUES, AND PROCEDURES TO IMPROVE COMBAT EFFECTIVENESS. EXAMPLES MIGHT BE COMBINATIONS OF:
  - ATTACK (OR SCOUT) HELICOPTER - CAS - ARTILLERY AIR DEFENSE SUPPRESSION TEAM.
  - CEWI ELEMENT - ARTY C^3 CM TEAM.
- TRADOC EXPEDITE, FOR EXPORTATION IN SUBSTANTIAL NUMBERS TO FIELD UNITS (ACTIVE AND RESERVE), AN INSTRUMENTATION PACKAGE CONSISTING OF MILES (WITH ARTILLERY PLAY) TYPE EQUIPMENT.
  - FIELD MACOM'S, IN CONJUNCTION WITH TRADOC, PURSUE DEVELOPMENT OF INNOVATIVE COMBINED ARMS TACTICS, TECHNIQUES AND PROCEDURES (DRILLS).

TASK FORCE MANAGEMENT

Command and control and integrated staff planning for combat operations at battalion level are quite complex in the U.S. Army, and are crucial to successful implementation of warfighting doctrine. We assume that the current Army development programs and experiments in command and control will be successful in providing the key elements needed for adequate command and control. However, we should also be able to plan operations at battalion level in substantially shorter times and thus gain greater rapidity of execution. There will be adequate data bases and tools for modeling and simulation, for wargaming, for dealing with terrain effects in various forms of engagements, and generally for adequate training in a realistic environment. The Army has made, and is making, substantial investments and the payoffs should produce the previously mentioned advantages.

Nevertheless, battalion planning today is neither mission nor contingency area specific. Theater deployed forces from time to time can visit and become somewhat familiar with one area of operation. The shortfalls are obvious. A unit may have to fight in an unfamiliar location. CONUS-based units may never have the opportunity to "walk the terrain and smell the enemy" in forward deployed theaters or in contingency areas like Southwest Asia.

What is needed is the ability to provide a battalion commander, his staff, and key support personnel the means to plan many battles in various areas of operation; i.e., to have available "battle book materials" prepared by otner battalions for many areas of potential combat.

Several candidate operations are suggested for investigation: maneuvering of task force elements in coordination with jamming of enemy surveillance; combined arms operations for Armor, Infantry, and Artillery in assault along with Close Air Support, Infantry, Engineering, and Artillery in defending force operation; and Artillery, attack helicopters and fixed-wing aviation providing defense suppression for an air mobile force insertion.

These cases are unusual in some respects and very commonplace in others. The combined arms problems which crop up here would be addressed using work stations and simulations in a training mode. These could be accomplished in extensive but brief CPXs conducted with equipment located for the most part in peacetime office space. Fewer FTX operations need take place to provide confidence and verification of the adequacy of procedures and techniques.

TASK FORCE MANAGEMENT

ISSUE: HOW CAN THE U.S. ARMY IMPROVE PLANNING AND TRAINING FOR WARTIME AND CONTINGENCY OPERATIONS THROUGH INNOVATIONS AT BATTALION LEVEL?

DISCUSSION:

- BATTALION IS THE LOWEST LEVEL AT WHICH STAFF-INTEGRATED PLANNING TAKES PLACE.
- ALL BATTALION LEADERS, AND KEY SUPPORTING PERSONNEL, ARE NOT THOROUGHLY FAMILIAR WITH THE TERRAIN AND ENVIRONMENT ON WHICH THEY MAY OPERATE.
- AIRLAND BATTLE'S OFFENSIVE EMPHASIS EXACERBATES THIS PROBLEM.
- FIELDED BATTALION PLANNING TOOLS ARE ESSENTIALLY STUBBY PENCIL.
- TECHNOLOGY, DATA BASES, VISUAL DISPLAYS, AND VARIOUS TOOLS ARE AVAILABLE TO DO MUCH MORE. EXAMPLES ARE:
  - READ-WRITE VIDEODISK
  - COMPUTER-GENERATED DISPLAY
    - FIELDS OF FIRE
    - ENEMY SURVEILLANCE FORCES
    - AIR DEFENSE COVERAGE
  - TRAFFICABILITY ASSESSMENT
  - DATA BASES
    - FUEL LOCATIONS
    - WATER
    - INTELLIGENCE PREPARATION OF THE BATTLEFIELD
  - PROLIFERATED COMPUTATIONAL SUPPORT

RECOMMENDATIONS:

- TRADOC, WITH FIELD MACOM ASSIST, EXPEDITE THE INVESTIGATION, EVALUATION, AND DEMONSTRATION OF AVAILABLE TECHNOLOGY, DATA BASES, DISPLAYS, AND TOOLS TO PRACTICE IN THE ENVIRONMENT IN WHICH UNITS WILL FIGHT.
- DA FUND AND PROLIFERATE TO FIELD UNITS.

COMBINED ARMS TRAINING STRATEGY

AirLand Battle is the Army's new offensive maneuver-oriented doctrine. To be effective, this doctrine requires horizontal coordination across functional areas, coordination with Air Force assets, and synchronization of forces in both time and space. ALB can be implemented with current equipment and forces. New combat, combat support, and CSS systems being procured under the modernization program will provide significantly enhanced capability to conduct ALB. Although multi-branch (e.g., Armor-Infantry team) training has been integral to previous Army doctrines, the horizontal coordination and synchronization demands of ALB make it imperative that commanders and their units train in fully integrated combined arms operations involving maneuver units, Army fire support, Army aviation, CAS and BAI, Air Defense, Intelligence and EW, Engineers, and Combat Service Support elements. This will require further detailing of the tenets and principles of ALB (as described in FM 100-5) and the development of specific tactics and procedures that must be practiced for its effective implementation.

Conducting full combined arms training in large units (Corps, Division, Brigade) is limited by on-post training areas which do not permit full-scale practice of large-unit operations. Emerging solutions to this problem involve innovative combinations of simulators, games, and field training exercises. The completion of the facilities at NTC provide important, periodic opportunities for armor and mechanized units to practice in a fully integrated battlefield environment. The NTC scenarios emphasize operations against a heavy force OPFOR (Motorized Rifle Regiment) in terrain best suited for heavy force operations. A corresponding facility for light forces is needed with terrain more suited to their employment (e.g., close, mountainous, jungle or urban terrain) and with an appropriate OPFOR.

TRADOC must expedite the development of a combined arms training strategy which describes the "what" and "how" of training for ALB. It is important to emphasize that by combined arms we mean the full spectrum of Army forces (and other Service assets) listed above. The "what" refers to specific combined arms tactics and procedures that need to be practiced to make a unit proficient in implementing ALB (e.g., in support of maneuver unit flank counterattack of the 2ER/1ED* at time T; initiation of BAI strikes within 1 hour of T to delay the lead regiments of the 2ED; application of MLRS fires to attrite and disrupt 2ER/1ED 30 minutes before T; jamming of 2ER/1ED command nets and provision of ADA support to the counterattack at T, etc.). The "how" aspect of training refers to the different modes of training (FTX, CPX, simulations, games, etc.) that can be used to train in combined arms operations. The strategy should delineate which field facilities will be used, required improvements in them, and training game/simulation/device enhancements needed to conduct the full spectrum of ALB combined arms training activities. As a priority issue, ODCSOPS should identify resource requirements to develop and implement the training strategy in time to influence the FY 86-90 POM. The Army needs a training facility for its light forces and should consider the establishment of a light force NTC.

* 2ER/1ED refers to the 2nd Echelon Regiments of the 1st Echelon Division.

COMBINED ARMS TRAINING STRATEGY

ISSUE: HOW TO DEVISE AN EFFECTIVE STRATEGY FOR FULL COMBINED ARMS TRAINING TO IMPLEMENT AIRLAND BATTLE

DISCUSSION:

- AIRLAND BATTLE DOCTRINE CALLS FOR OFFENSIVE MANEUVER, HORIZONTAL COORDINATION, AND SYNCHRONIZATION IN TIME AND SPACE (DEEP, CLOSE-IN, REAR)
- ADEQUATE TRAINING FOR BOTH LEADERS AND UNITS IS CRUCIAL FOR EXPLOITATION OF ALB DOCTRINE. TRAINING FOR THE FULL COMBINED ARMS TEAM IS REQUIRED
- SPECIFIC COORDINATION/SYNCHRONIZATION TACTICS MUST BE DEVELOPED FOR USE BY FIELD UNITS TO TRAIN IN ALB
- UNITS IN U.S. AND OVERSEAS HAVE VERY LIMITED TRAINING AREAS WHICH RESTRICT BOTH FIRE AND MANEUVER TRAINING
- THERE IS NO NTC EQUIVALENT FOR LIGHT FORCES
- TRAINING STRATEGY MUST CONSIDER EVENTUAL TRANSITION TO ALB 2000

RECOMMENDATION:

- TRADOC DEVISE A TRAINING STRATEGY TO DEVELOP LEADERS AND UNITS FOR AIRLAND BATTLE.
  - PUBLISH SPECIFIC COMBINED ARMS TACTICS (TO INCLUDE CS, CSS, AND OTHER SERVICES) TO IMPLEMENT ALB DOCTRINE AT CORPS, DIVISION, AND BRIGADE
  - IDENTIFY TRAINING FACILITY REQUIREMENTS AND NEEDED IMPROVEMENTS
  - IDENTIFY REQUIREMENTS FOR IMPROVED TRAINING GAMES, DEVICES, ETC
- ODCSOPS IDENTIFY RESULTING RESOURCE REQUIREMENTS IN TIME TO INFLUENCE FY 86-90 POM
- DA CONSIDER ESTABLISHING AN ADDITIONAL NTC TO OPTIMIZE TRAINING AND EMPLOYMENT OF LIGHT FORCES

FUTURE DEVELOPMENT GOAL

HOW TO EQUIP?

OVER-ALL ASSESSMENT OF FUTURE DEVELOPMENT GOAL FROM EQUIPPING POINT OF VIEW

The environment having to do with the U.S. National Security is extremely challenging when one considers the Soviet posture and potential global problems facing the U.S. This makes the task facing the U.S. Army extremely formidable. Yet the environment in the Army is full of opportunities. The Army leaders are looking for innovation -- for changes that would significantly improve their warfighting capability. This is probably more true now than at any time in the Army's history. The image of the Army is not that of innovation, yet it has done some very innovative things in the last few years -- establishing the ninth ID High Technology Test Bed, developing the concept of AirLand Battle 2000 (striking deep), etc.

The severity of what we are up against as a nation is overwhelming and not broadly understood, but in spite of many bleak statistics, the U.S. has a lot going for it. Because of our free society, our people are more innovative and flexible. Of equal or greater importance, particularly from an equipping point of view, the U.S. has a GNP three times that of the Soviets. Clearly the only hope for the Army to meet the challenge it faces is to take as full advantage as possible of these two factors. In particular, it must take advantage of those areas of technology in which the U.S. leads and where Soviet inflexibility can be exploited.

The U.S. has the high-technology lead in microelectronics, computer science (including algorithm development), sensors, and probably materials. While these technologies can make high-leverage improvements in present types of weapons systems and equipment, the major improvements in effectiveness at an affordable cost can come only by addressing the Army as a total system -- not as independent branches in some "combined arms" fashion and in isolation from the Air Force, Navy, and Marines.

We need an integrated arms approach! Thus the equipping panel's emphasis on establishing an Integrated Land-Air Warfare Development Group. We are on the threshold of having warfighting capabilities only dreamed of in the past. Technology is going to make it possible for a commander to have realtime or near-realtime information on enemy targets and friendlies that is highly accurate and displayed to him in such a manner that he can better fight the battle. His interactive display/computer will present alternatives offering a flexible fighting capability. Of equal or greater importance, he can have weapons that are much more autonomous and accurate so that his logistics burden can be greatly reduced.

The Army cannot take advantage of what high technology can offer by doing business as usual! It is necessary not only to take an integrated arms approach but also to be innovative about the whole development cycle from needs generation to deployment. Bringing together users and developers early, in a meaningful way, to get data upon which decisions can be made regarding those systems which will be produced, is essential. The present cycle is far too time consuming and completely out of sync with what goes on in the commercial field -- particularly the fast-track computer field, where so much of the action is now and for the near future.

For this reason the equipping panel strongly endorses the embryonic demonstration programs in DARCOM and recommends that this type of approach become a way of life for moving more rapidly from concept to deployment -- utilizing commercial surrogate equipment where possible and equipment from other services where this is practical.

THE FUTURE DEVELOPMENT GOAL

- WHAT MAKES AN INNOVATIVE ENVIRONMENT?
- HOW MUCH INNOVATION? WHERE AND WHO?
- AREAS FOR INVESTIGATION
- ISSUES
- RECOMMENDATIONS

STARTING POINT

The question of "How to Equip" the Army is not a new subject for the Army Science Board. Studies on how to improve the research, development, and acquisition process in the Army go back to the early 50s, when Dr. James Killian, Chairman of the Advisory Group of Scientists and Engineers then serving the Army, and Secretary of the Army Pace, called for integrating the programs of the Technical Services in presentations to the Congress.

In more recent times, specifically the 1979 Summer Study, "Technology Planning of Future Fielded Systems," the whole question of shortening the cycle of R&D to procurement came under close scrutiny. SS 79 noted the requirement:

- for early fielding of systems that have reached an acceptable level of technical performance and maturing them to final specification in the field
- for plans to improve systems performance with Block II Product Improvement Programs (P^3I)
- for development and maintenance of a stable, long-range plan.

A subsequent Summer Study in 1980 made recommendations regarding the 9th Infantry Division as an innovative test bed for the application of high technology to raise the combat effectiveness of a light division, and contributed ideas for test in that environment.

Again, in SS 81, ASB technical recommendations were combined by the Army into the five thrusts having to do with VISTA, Distributed C^3, Self-Contained Munitions, Soldier-Machine Interfaces, and Biotechnology. Although some work in these fields was already going on in the Army, particularly in Distributed C^3 and Self-Contained Munitions, the SS 81 recommendations constituted innovative approaches, using, in many cases, almost-off-the-shelf equipment. In other cases, recommendations were made for high-priority developments in fields particularly important to the Army, such as automatic target recognition, focal plan arrays, and artificial intelligence.

It is to be noted that the Army has taken innovative initiatives as a result of these Army Science Board studies, and is requiring major program status reports and instituting rapid corrective actions. It is the sense of this Study Group that the Army is to be complimented for decisive actions in this regard and should continue such management initiatives within DARCOM and DCSRDA as a matter of priority.

STARTING POINT

- ARMY HAS BEEN RESPONSIVE TO RECENT ASB SUMMER STUDIES
  - SS 79 - ARMY DEVELOP LONG-RANGE PLANNING - STABILITY
  - SS 79 - EARLY FIELDING - MATURATION IN FIELD - P^3I
  - SS 80 - RECOMMENDATIONS FOR 9TH DIVISION HTTB - LIGHTER
  - SS 81 - TOP RECOMMENDATIONS COMBINED INTO FIVE THRUSTS
- ARMY HAS TAKEN INNOVATIVE INITIATIVES
  - MAJOR PROGRAM STATUS REPORTS - RAPID CORRECTIVE ACTION
  - FOCUSING INTERESTS OF R&D COMMUNITY
- WITH HIGHEST PRIORITY - CONTINUE THE PRESENT ONGOING MANAGEMENT INITIATIVES WITHIN DARCOM AND DCSRDA

PRIORITY AREAS CONSIDERED BY EQUIPPING PANEL

In the remainder of this section of the report, issues, discussions and recommendations are discussed in the order of the priority areas listed below.

PRIORITY AREAS CONSIDERED BY EQUIPPING PANEL

- THE ARMY AS A SYSTEM
- EXPANDING ON APPROACH OF 9TH INFANTRY DIVISION-HTTB
- ESTABLISHING AN INTEGRATED CONCEPT VALIDATION CAPABILITY
- SHORTENING THE CYCLE FOR INNOVATIVE DEVELOPMENTS
- RAPID MOVEMENT TOWARD ALB 2000
- INNOVATION IN LARGE, MATURE ORGANIZATIONS
- THE ARMY LONG-RANGE RDA PLAN: FRAMEWORK AND STIMULUS FOR INNOVATION
- TAKING ADVANTAGE OF SERENDIPITY
- AFFORDABILITY
- ARMY/DARPA INTERACTION

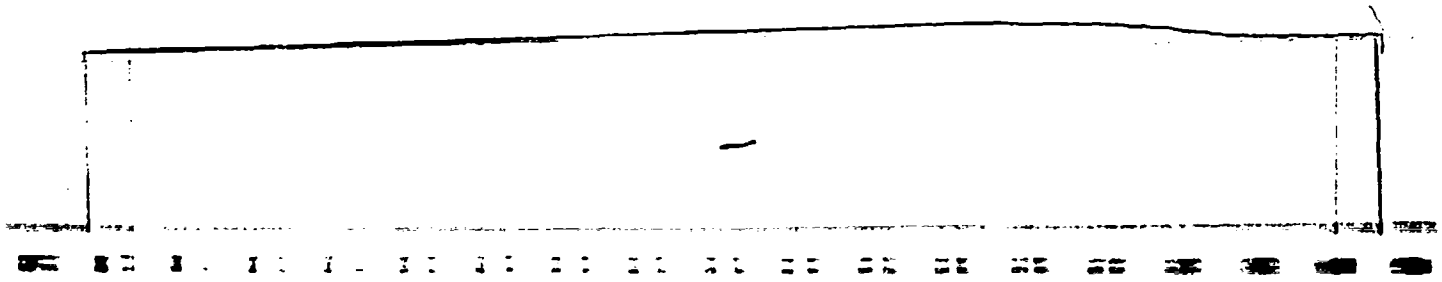
THE ARMY AS A SYSTEM

The Army will have to make major changes in tactics, organization, and equipment to move towards the concepts embodied in AirLand Battle 2000. It is essential that Army forces (and associated Air forces) be addressed as a system in assessing and improving warfare capabilities. The present organizational structures and procedures impede this system approach in two ways. The detailed assessment of mission areas is done by branch, the "n" armies. Secondly, the joint development of new tasks and equipment concepts is impeded rather than facilitated by the organizational separation of TRADOC and DARCOM. The joint formulation is desirable in general, but is essential for revolutionary developments.

We recommend that a first step be taken towards a new approach by establishing an Integrated Land-Air Warfare Development Group (ILAWDG) for providing impetus to the most needed "revolutionary" developments exploiting the combination of new technological developments with new tactics. The initial specific warfare areas to be considered should be based on a judgment as to where "revolutionary" developments are most needed and feasible and where it is essential to cut across branch lines. Some suggested warfare areas are (A) electronic warfare in its broadest connotation, (B) anti-air warfare responding to new technological developments and the AirLand Battle tactical concepts, and (C) offensive warfare (close combat including VISTA and C^3I).

We also recommend that this new group function on a Task Force basis. The priority objective of the Group should be to examine how the effectiveness of the major equipment items in the Army's modernization program could be greatly enhanced by new tactics and equipment (such as VISTA, Distributed C^3I, Self Contained Munitions) in the context of the AirLand Battle of the future.

In most cases, we anticipate the need for troop exercises to validate the tactical and equipment concepts proposed by the Task Force. The HTTBs, or others, could be charged with the responsibility for designing and carrying out these concept validation exercises.



THE ARMY AS A SYSTEM

ISSUE: HOW CAN AN ENVIRONMENT AND ORGANIZATION BE ESTABLISHED THAT WILL TREAT THE ARMY COMBAT FORCES AS AN INTEGRATED SYSTEM, AND AS A PART OF THE TOTAL ALB FORCE?

DISCUSSION:

- PRESENT ORIENTATION IS TO THE BRANCH ARMIES RATHER THAN AN INTEGRATED ARMY.
- TOTAL SYSTEM THINKING INADEQUATELY REFLECTED IN LRP, REQUIREMENTS, DEVELOPMENT, TESTING, FIELDING LOGISTICS, AND TRAINING PROCESS.
- NEED FOR A SYSTEMS PROCESS INTEGRATING TRADOC, DARCOM, LITTLE THREE (CORPS OF ENGINEERS, MEDICAL R&D COMMAND, ARI), AND CONTRACTORS TO PROVIDE IMPETUS FOR INNOVATIVE DEVELOPMENTS OF POTENTIALLY HIGH IMPACT

RECOMMENDATIONS:

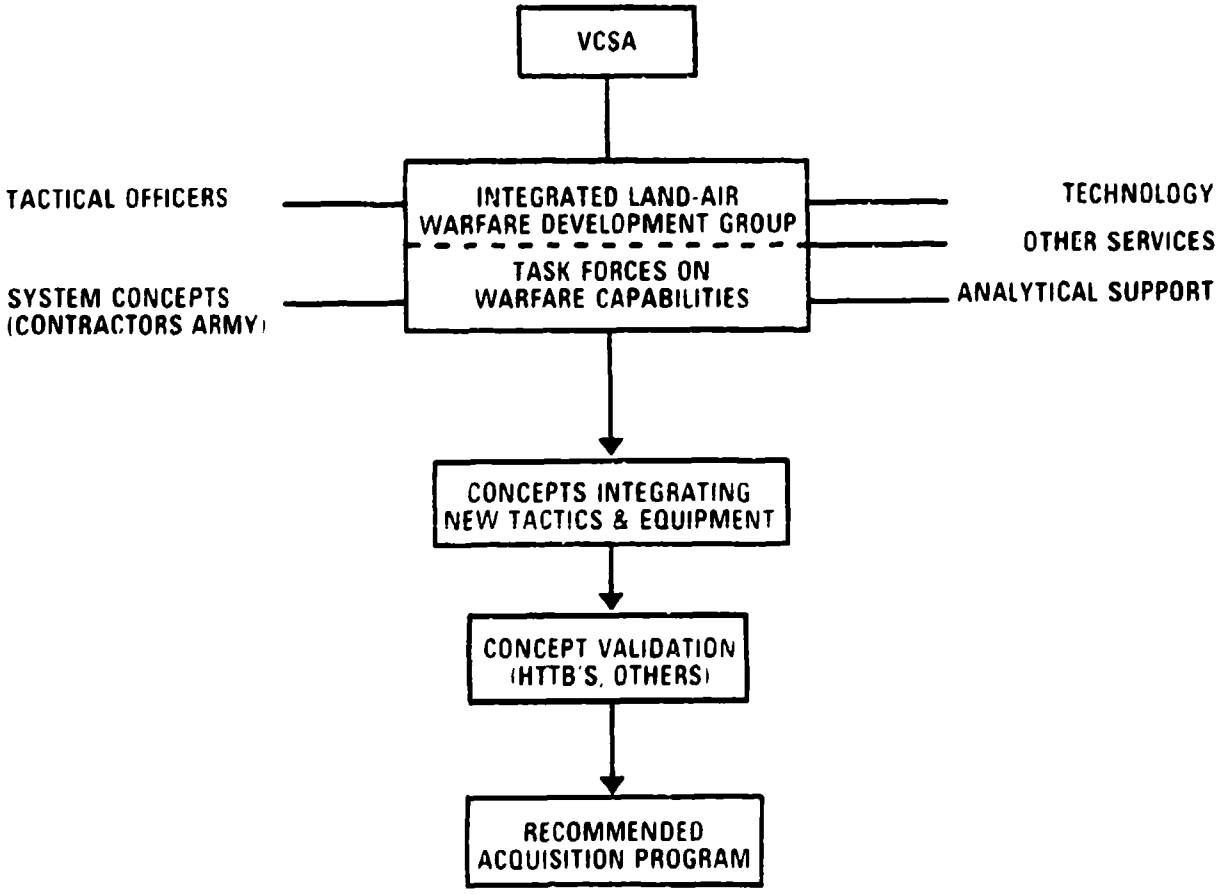
- ESTABLISH AN INTEGRATED LAND-AIR WARFARE DEVELOPMENT GROUP (ILAWDG) TO ADDRESS WARFARE AREAS OF POTENTIALLY REVOLUTIONARY DEVELOPMENTS
  - AS AN INITIAL STEP, TO BRING TOGETHER TACTICAL AND TECHNOLOGICAL PEOPLE TO ASSESS WARFARE AREAS THAT CROSS BRANCH AND SERVICE LINES.
  - DEVELOP CONCEPTS STARTING WITH AND INTEGRATED WITH THE MAJOR ELEMENTS OF THE MODERNIZATION PROGRAM EMPLOYING NEW TACTICS AND NEW TECHNOLOGY.
  - PUT EMPHASIS ON THE CAPABILITY IMPLIED IN AIRLAND BATTLE 2000.
  - DEVISE PLANS FOR CONCEPT VALIDATION BY HTTB'S OR OTHERS.
  - CSA CONVENE A SPECIAL TEAM TO PLAN ESTABLISHMENT OF THE GROUP
- DARCOM COMMODITY COMMANDS UTILIZE CONTRACTOR TEAMS FOR DEVELOPMENT OF FUTURE SYSTEM CONCEPTS - GIVING FOCUS TO LONGER RANGE TECHNOLOGY

THE ARMY AS A SYSTEM (CONT'D)

Each Task Force would include tactical officers from the TRADOC community and appropriate technological experts from the DARCOM laboratories. The necessary funds would be provided to enable the Task Force to obtain analytic support from other organizations and to commission contractor system concept studies to add to Army-generated system concepts. Participation by other Services is particularly important. The permanent Group would be kept small – – a total of perhaps 15 high-caliber people, and should be led by a General Officer. The steps from formation of a Task Force, including its composition, to recommendations for acquisition programs are depicted below. We recommend that the CSA convene a special team in order to plan the establishment of the Group and to settle the questions of where the Group should be located and where the Group should report in the Army Staff.

The second recommendation stems from the kind of excellent results obtained by TACOM in their contracts for developing system concepts for "Future Close Combat Vehicle Systems." Such a program has several advantages. It provides advanced systems thinking by a large community of knowledgeable people. It helps give direction to technology development. It helps provide insight into what high-leverage technology can provide to make the Army systems more effective, and it illustrates the need for higher level integration. These commodity command system studies would also be of considerable value in the work of the Task Forces of the recommended ILAWDG by providing a broad range of system ideas.

THE ARMY AS A SYSTEM (CONT'D)



EXPANDING ON APPROACH OF 9TH INFANTRY DIVISION – HTTB

The concept of experimenting with new ideas using an active division as a test bed has been successful enough to justify expansion of this approach to other organizations. The HTTB appears to have done a good job. It has created new concepts, changed organization, and reduced transportation requirements. The HTTB has also been receptive to new ideas. A good example of this is Distributed C^3. In this area, CECOM is carrying out a program of utilizing commercial equipment and, with some product improvement, equipment from other Services.

The 9th Infantry HTTB has concentrated on the light forces. The heavy forces, armored and mechanized divisions, can also benefit from experimental, innovative approaches in such areas as continuous night-fighting, Distributed C^3, $V(INT)^2$, etc. There is considerable instrumentation at Fort Hood which could be very useful in support of such experiments. This could argue for use of an armored unit for a heavy force HTTB, but other considerations may lead to a choice of some other unit.

Over the last few years, the Army has put much more emphasis on the Reserves and National Guard as an integral part of the fighting force. However, we see little indication of innovation in these organizations or activity directed specifically at solving problems through the Reserve Forces. Certainly these organizations include many people who are creative and technically occupied in civilian life. Designating certain units to aid in experimenting with and demonstrating new concepts would be likely to make significant contributions to the development of the total Army system.

The HTTB experience with the 9th Infantry Division at Fort Lewis led to the creation of an agency, ADEA, to provide over-all management support of the hardware testing activities of the HTTB. ADEA is commanded by CG, 9th Infantry Division. If similar testing is done in a heavy division at some other site, a support agency like ADEA will be required. To avoid redundancy of experiments and build on experience already gained with the 9th Infantry Division, it would be prudent to expand the responsibilities of ADEA to cover both efforts. Relative rank of commanders, physical separation of the HTTB's, and desire for independence make such a course impractical. The logical course is to create a second unit like ADEA for the heavy division HTTB, leaving coordination of their activities to AUTOVON, liaison, and the approving authority in ODCSOPS. To take advantage of ADEA experience, ADEA could contribute the cadre to organize the ADEA-like unit for the heavy force HTTB. Developments that follow from ADEA/HTTB initiatives are not likely to realize their full potential for the whole Army without an effective mechanism to assure their full and objective consideration by those involved in requirements generation, development, and acquisition. The Army must set up a formal feedback system that will meet this need.

EXPANDING ON APPROACH OF 9TH INFANTRY DIVISION - HTTB

ISSUE: ARE THERE OTHER UNITS THAT SHOULD BE MADE TEST BEDS TO ENCOURAGE EXPERIMENTAL APPROACHES THAT CAN HAVE MAJOR IMPACT ON ARMY CAPABILITIES?

DISCUSSION:

- HEAVY FORCES CAN BENEFIT FROM EXPERIMENTAL, INNOVATIVE APPROACHES IN SUCH AREAS AS CONTINUOUS NIGHT FIGHTING, DISTRIBUTED C^3, $V(IMT)^2$, ETC.
- EXPECT COMMONALITY IN APPLICATION OF MANY INNOVATIONS BETWEEN LIGHT AND HEAVY FORCES.
- 9TH INFANTRY DIV, AS A HTTB, HAS DEMONSTRATED THAT AN OPERATIONAL UNIT, GIVEN THE CHARTER, CAN BE INNOVATIVE.
- COMPARATIVELY LITTLE ATTENTION GIVEN TO INNOVATION FOR SUPPORT OF RESERVES AND NATIONAL GUARD.
- ADEA EXPERIENCE COULD SERVE AS CADRE TO HELP CREATE ADEA-LIKE UNIT TO MANAGE HEAVY DIVISION AND RESERVE OR NATIONAL GUARD HTTB.

RECOMMENDATIONS:

- ADEA BE USED AS CADRE FOR ADEA-LIKE UNIT TO MANAGE HTTB ACTIVITIES OF A HEAVY DIVISION WITH PARTICIPATION OF RESERVE AND/OR NATIONAL GUARD UNITS.
- ADEA AND COUNTERPART BE AUTHORIZED AND FUNDED TO PERFORM EXPERIMENTS AND TO DEMONSTRATE INNOVATIVE CONCEPTS AND/OR INNOVATIVE WEAPONS OR EQUIPMENT.
- COORDINATION OF ACTIVITIES OF BOTH HTTB'S BE BY LIAISON OR DCSOPS APPROVALS.
- ARMY DEVELOP A FEEDBACK SYSTEM FOR INTRODUCING RESULTS FROM ADEA INTO THE ARMY SYSTEM.

ESTABLISHING AN INTEGRATED CONCEPT VALIDATION CAPABILITY

The concept of ALB 2000 employs Air Force and Army units in a coordinated manner, in operations extending over great distances deep into enemy territory. In order adequately to evaluate the operational utility and effectiveness of new concepts, tactics, doctrine, and equipment, facilities are required on which Army units as well as Joint Service operations can be evaluated.

A large number of facilities owned by the Army, Air Force, Navy, and Marines exist in the Southwestern and Western part of the U.S. -- extending from Fort Hood and Bergstrom Air Force Base to the National Training Center, Nellis Air Force Base, China Lake, and Camp Pendleton. Those facilities are primarily used for individual Service testing as well as limited Joint Service tests and/or exercises conducted by the Central Command. They encompass variation in terrain and, in some cases, are well instrumented.

The current TAC/TRADOC plan for the conduct and evaluation of Joint tests reflects the need for this effort. However, we believe the current plan is too limited in scope, and that more extensive testing of Joint Service Operational Concepts is needed in order properly to evaluate tactics and equipment as well as to determine how well the Service interfaces have been established and addressed. Concepts employing RPVs, operation in an EW environment, integrated target acquisition, deep attack, and communication on the battlefield are examples of some areas to be addressed.

It is recognized that proofs-of-concept of this nature are costly to plan, conduct, and evaluate. We believe that there is potential for achieving a substantial increase in testing without resulting in unacceptable costs, if all of the DOD resources are utilized in a coordinated manner. Therefore, we recommend that the Army take the lead, and invite the other Services to participate in an investigation of all Service facilities which could be made available for this purpose. We believe that such initiative on the part of the Army would be received favorably by OSD and the Congress.

ESTABLISHING AN INTEGRATED CONCEPT VALIDATION CAPABILITY

ISSUE: HOW CAN THE INTEGRATED CONCEPTS OF AIRLAND BATTLE 2000, INCLUDING THE EXTENDED BATTLEFIELD, BE DEMONSTRATED IN THE U.S.?

DISCUSSION:

- THE CONCEPTS OF AIRLAND BATTLE 2000 REQUIRE JOINT SERVICE OPERATIONS OVER GREATER DISTANCES THAN AVAILABLE IN ANY SINGLE TEST/TRAINING FACILITY IN THE U.S.
- A LARGE NUMBER OF FACILITIES BELONGING TO ARMY, AIR FORCE, NAVY, AND MARINES EXIST IN THE SOUTHWEST AND WEST, FROM FT. HOOD AND BERGSTROM AIR FORCE BASE TO THE NATIONAL TRAINING CENTER AND NELLIS AIR FORCE BASE. SOME OF THOSE FACILITIES ARE WELL INSTRUMENTED.
- PRESENT TAC/TRADOC PROGRAM FAR TOO LIMITED IN SCOPE TO MEET REAL NEED.
- OPPORTUNITY FOR THE ARMY TO DEMONSTRATE ITS FORWARD THINKING TO OSD AND CONGRESS BY INITIATING A JOINT EFFORT.

RECOMMENDATION:

- DCSOPS, AS A MATTER OF MAJOR PRIORITY, LEAD INVESTIGATION OF HOW THE FACILITIES AND RESOURCES OF THE VARIOUS SERVICES CAN BE USED AND MANAGED IN A COORDINATED, TIMELY MANNER TO DEVELOP AIRLAND WARFARE TACTICS, DOCTRINE, AND EQUIPMENT.

SHORTENING THE CYCLE FOR INNOVATIVE DEVELOPMENTS

For some years the research and development (R&D) and first acquisition resources of the Army have been directed to force modernization, somewhat at the expense of longer range, innovative developments. Those resources can now be directed to these important, but neglected goals. The issue now is how to maximize the effectiveness of that redirection.

All potential improvements in military equipment affect the way the forces fight to some degree. But here we would like to focus on improvements that have the potential for substantial impact on tactics and organization. Under these circumstances it is very difficult to assess the military value of the improvements without military exercises carefully designed to assess the effectiveness of alternative tactics and force structure. The objective is to reach agreement on performance requirements and on what equipment and systems should be developed having conducted experiments on "How to Fight" with the equipment or a surrogate of that equipment.

The focus on "innovative" developments has other implications. Most important, the Army must look for major changes in capability. Because of the fundamental uncertainties involved, cost/effectiveness analyses are not an adequately suitable vehicle for determining the value of innovative concepts. One should not become obsessed with "optimum" solutions. At the innovative stage, optimal solutions cannot be determined anyhow. The Army should be satisfied with good indications of substantial gains and confirm such indications through concept validation experiments. The DARCOM initiative in establishing a program to demonstrate early results of the technology thrusts, including that of VISTA, is a positive step in that direction and is strongly endorsed.

There are many useful and important developments that do not fit these criteria and that are susceptible to more detailed and quantitative evaluations. The proposed policy would establish two alternative paths for the initiation of new system developments. One path would be based on "evolutionary" developments where the major emphasis could be on product improvements that do not raise difficult "How to Fight" issues. Such developments could, in many cases, be satisfied by commercially available equipment, and indeed AR 70-1 calls for such an acquisition policy. The second path would be designed to exploit new technology in an innovative way in the context of new tactics and, if necessary, new force structure.

Those dealing with new requirement definitions should do extensive reading to keep up with the state-of-the-art, but it is very difficult for one not actively engaged in a field to remain adequately informed. A periodic preparation of a list of innovative, potentially high-leverage developments would help greatly to keep the entire RDA and TRADOC requirements communities informed and focused.

SHORTENING THE CYCLE FOR INNOVATIVE DEVELOPMENTS

ISSUE: HOW CAN THE ARMY SHORTEN THE ENTIRE CYCLE FROM FIRST RECOGNITION OF A NEED THROUGH OPERATIONAL READINESS OF INNOVATIVE HIGH-LEVERAGE SYSTEMS AND EQUIPMENT?

DISCUSSION:

- HAVING COMPLETED THE RESOURCING OF MODERNIZATION FOR DIVISION 86, TIME IS NOW CRITICAL TO RESPOND TO HARDWARE REQUIREMENTS OF ALB.
- CONCEPT VALIDATION AND TESTING ARE URGENTLY REQUIRED.
- REQUIREMENTS OFTEN DEVELOPED WITHOUT SUFFICIENT UNDERLYING TECHNICAL AND TACTICAL DATA AND UNDERSTANDING.
- CURRENT LONG CYCLE RESULTS IN OBSOLESCENCE BEFORE DEPLOYMENT.
- ALTERNATE PROCEDURES FOR PROCUREMENT OF EQUIPMENT, INCLUDING COMMERCIAL EQUIPMENT, CAN BE ON MUCH FASTER TRACK DEVELOPMENT CYCLE.
- FOR CONCEPT VALIDATION, SHOULD USE EQUIPMENT FROM WHATEVER SOURCES AVAILABLE -- NOT WAITING UNTIL ALL DEVELOPMENTAL HARDWARE IS IN HAND.

RECOMMENDATIONS:

- ARMY EXPAND USE OF ALTERNATIVE PROCEDURES FOR ACQUISITION OF HIGH-IMPACT SYSTEMS -- BASED ON PRIOR EXPERIMENTAL DEMONSTRATION/CONCEPT VALIDATION.
- DCSRDA DEVELOP, PERIODICALLY, A SHORT LIST OF NEW "INNOVATIVE" HIGH-LEVERAGE DEVELOPMENTS SUBJECT TO SPECIFIC ACQUISITION ACTION.

RAPID MOVEMENT TOWARD ALB 2000

In the long run, the Army will require major changes to equipment, organization, and tactics in order to employ the tactical concepts in ALB 2000. The major new modernization systems were designed to operate together on a different battlefield. If we are to move quickly in the direction of ALB 2000, it is essential to adapt these new systems, as far as feasible, to the new battlefield where small, flexible units must be operated and maintained, far from centralized command and support. We recommend that a fast-track (3-5 years) acquisition plan be adopted to achieve the objective, applying available technology as a "value added" multiple system Product Improvement Program.

The focus of the fast-track (3-5 years) program should be in those areas which will upgrade existing platforms, support systems, training systems, and weapons through "technology value added." Areas of emphasis are:

- Automated sensor processing (push algorithm developments – they are nearly there)
- Terminal guidance, warhead, lethality combinations (an integration matter with algorithms above)
- "Smart" maintenance and logistics – AI (expert systems)
- Information collection, processing and display
- Communications
- Training technology

It should be noted that the last three areas listed above can be handled most inexpensively and expeditiously by employment of commercial equipment.

Driving these value-added programs with a combination of performance, cost, and completion time will bring out innovative designs which must be developed in 12 to 18 months, create a proper balance of engineering performance, producibility, and maintainability, and decrease incentives for contractors to buy into a short program with little or no opportunity for changes in requirements.

The recommended "fast-track" program would involve major systems that, more than in the past, must be integrated to achieve the integrated operational capability essential for ALB 2000. This can best be done by appointing a single program manager for Common Product Improvement applicable to multiple platforms. Integration can be assured while avoiding undesirable duplication in the introduction of new technology.

DARCOM should insure a "competition of ideas": that ideas for accomplishing these improvements are drawn from a diversity of sources; e.g., DOE, contractors, and universities as well as the Army itself. It is important that DARCOM and TRADOC develop procedures for the fast justification of commercial equipment when this procurement track appears to be possible.

RAPID MOVEMENT TOWARD ALB 2000

ISSUE: HOW CAN WE MAKE THE SPIRIT OF ALB 2000 HAPPEN QUICKLY?

DISCUSSION:

- ALB 2000 PACED BY HARDWARE AVAILABILITY IN FIELD, OPERATED AND SUSTAINED IN SMALL FLEXIBLE UNITS FAR FROM CENTRALIZED COMMAND AND SUPPORT.
- THREE PROGRAMS ARE NEEDED: (1) AN ABILITY TO PROCURE COMMERCIAL EQUIPMENT RAPIDLY; (2) A RAPID RESPONSE CAPABILITY TO QUICKLY AND INNOVATIVELY AUGMENT OUR PRESENT PLATFORMS TO IMPLEMENT THE SPIRIT OF ALB 2000; (3) A CAREFUL PROGRAM TO DESIGN AN INTEGRATED SET OF REPLACEMENT HARDWARE FOR INTRODUCTION IN THE LATE 90'S, FULLY MEETING ALB 2000.

RECOMMENDATIONS:

- FORMALIZE A FAST-TRACK (3-5 YEARS) ACQUISITION SYSTEM TO MAKE LARGE STRIDES TOWARDS ALB 2000 APPLYING THE MAJOR TECHNOLOGY THRUSTS TO CURRENT PLATFORMS.
  - THE MAJOR NEW MODERNIZATION SYSTEMS WILL BE PART OF ALB 2000, BUT INTEGRATED MULTIPLE SYSTEM P^3I NEEDED FOR TOTAL COMBAT FORCE CAPABILITY.
- APPOINT A SINGLE PROGRAM MANAGER FOR ACHIEVING AN INTEGRATED OPERATIONAL CAPABILITY FOR THIS FAST-TRACK PROGRAM.
- RUN "FAST-TRACK" FROM DARCOM WITH THE WIDEST POSSIBLE COMPETITION OF IDEAS (ARMY, DOE, CONTRACTORS, UNIVERSITIES)
- USE "CONVENTIONAL" ACQUISITION, AS MODIFIED BY SUGGESTIONS MADE EARLIER, FOR NEXT-GENERATION EQUIPMENT FULLY MEETING ALB 2000.
- DARCOM AND TRADOC DEVELOP PROCEDURES FOR FAST JUSTIFICATION OF COMMERCIAL EQUIPMENT WHEN THIS TRACK CAN BE USED.

INNOVATION IN LARGE, MATURE ORGANIZATIONS

There have been numerous studies regarding innovation and the innovation process as it relates to various types of organizations. However, there appears to be a scarcity of effort devoted to how one establishes and maintains a creative environment in large, mature Government organizations. This problem was discussed in considerable detail with the more innovative DARCOM Laboratory Directors, the Director of Army Medical Research, and representatives of the Corps of Engineers. Our over-all assessment indicates that innovation occurs in some organizations and is noticeably absent from others. We also observed that the most successful laboratory managers were those who are able to make the system work reasonably well in spite of bureaucratic, time-consuming administrative procedures, and did, in some cases, achieve programs with considerable innovative content. We believe that the laboratory director is key to the creative output of the laboratory. Therefore, this Panel recommends that in those cases where the activities of the laboratory are important to ALB 2000 and where the laboratory is weak -- change the management.

Summer Study 82 pointed out the need to improve the environment for innovation, and identified a series of recommendations aimed at both military and civilian manpower involved in the RDTE process. "Innovation is very sensitive to people and people motivations" and if a number of the recommendations are implemented, significant improvement in innovation would result. There is a need to improve personnel management policies in order to foster and promote innovation.

The stimulus of technological challenge, acceptance of risk, freedom to pursue R&D coupled with rewards for success, need to be emphasized throughout the Army. Therefore, DCSRDA should develop guidelines for innovation for use within the laboratory system. These should include:

- Identification of innovative people and managers
- Teaming them with wise mentors
- Identification of managers who recognize innovation
- Shielding of innovators from too much bureaucratic administration
- Top management taking necessary risks to support innovative programs
- Using Task Forces (including people who know where the resources are)
- Keeping groups small
- Keeping a bias for action, and
- Reducing and avoiding layering.

We recommend that DCSRDA establish rewards for innovative use of computers and other advanced technology resources in various laboratories, and also reward those individuals and teams who achieve significant stimulation of creativity and innovation in industry.

The top Five Thrusts resulting from SS 81, including Distributed C^3 and VISTA, have served as a stimulus to the laboratories for identifying important needs of the Army and creating an environment of challenge to the Army laboratories. Distributed C^3 seems to be moving well. VISTA is still suffering from a lack of funding and attention. It is difficult to implement because it cuts across several laboratories. We recommend that DCSRDA, supported by TRADOC and the broader science and technology community, periodically (every 3-5 years) identify new technology thrusts which can have a significant impact on the Army's combat capabilities. We would like to note that, while innovation in the laboratories is the primary thrust of this issue, it is recognized that an important function of the laboratory is to support the Army's development programs, and therefore it is necessary to maintain a balance of these two essential but different activities.

INNOVATION IN LARGE, MATURE ORGANIZATIONS

ISSUE: HOW CAN THE ARMY ESTABLISH AND MAINTAIN INNOVATION/CREATIVITY IN ITS LABORATORIES TO THE DEGREE NEEDED?

DISCUSSION:

- SUMMER STUDY 82 POINTED OUT NEED TO IMPROVE ENVIRONMENT FOR INNOVATION IN ARMY LABS.
- THE MOST SUCCESSFUL LAB MANAGERS LEARN HOW TO MAKE SYSTEM WORK REASONABLY WELL DESPITE THE BUREAUCRATIC, TIME-CONSUMING ADMINISTRATIVE PROCEDURES. APPLY LESSONS LEARNED.
- SOME ARMY LABS ARE INNOVATIVE AND OF HIGH QUALITY, BUT OTHERS LACK IMAGINATIVE LEADERSHIP. SES SYSTEM PROVIDES FLEXIBILITY FOR LEADERSHIP CHANGES.
- NEED FOR BALANCE BETWEEN INNOVATIVE PROGRAMS AND SUPPORT OF DEVELOPMENT PROGRAMS.
- THE FIVE ARMY THRUSTS ARE AN IMPORTANT STIMULUS TO INNOVATION IN ARMY LABS.

RECOMMENDATIONS:

- CHANGE LABORATORY TOP MANAGEMENT IN THOSE LABORATORIES IMPORTANT TO EQUIPPING THE ARMY FOR ALB 2000 THAT HAVE BEEN RATED LOW BY DCSRDA/DARCOM/LITTLE THREE.
- ARMY IMPLEMENT RECOMMENDATIONS OF SS 82 ON S&E PERSONNEL.
- ARMY DEVELOP GUIDELINES TO INNOVATION IN THE ARMY LABORATORIES.
- DCSRDA PERIODICALLY (3-5 YEARS) UPDATE ARMY'S PRIMARY TECHNOLOGY THRUSTS WITH SUPPORTING BUDGETS AND MANPOWER ALLOCATIONS.

THE ARMY LONG-RANGE RDA PLAN: FRAMEWORK AND STIMULUS FOR INNOVATION

The Long-Range RDA planning process can and should serve both as a permissive framework and a deliberate stimulus to the innovative process. One of its primary functions is to focus innovation/creativity on the Army's ability to meet the evolving threat. Prudent applications of advanced technology must be introduced at the right time; the RDA Plan must clearly reflect opportunities as well as constraints in this regard. The Army has made substantial progress in perfecting its long-range planning process. There is, however, still concern about the lack of consonance between "The Army Plan" (the top-level document approved by the CSA, setting Army goals and objectives and directing the Army's strategy to achieve the same) and, on the other hand, the Long-Range RDA Plans. The currently documented Long-Range RDA Plans are mostly combinations of individual "commodity" plans -- competent when considered individually, but lacking in the aggregate the perspective offered by the integrated long-term strategic thinking. The emphasis on new concepts and on the introduction of innovations is subdued and stifled by the apparent rigidity of the plan.

The involvement of top Army management is insufficient to support the true purposes of the long-range planning. The long-range plan is, in some quarters, regarded as an imposition rather than a valuable, powerful instrument reflecting the personal convictions of senior Army managers. In its present shape, the long-range plan for RDA falls short, by far, of offering a cogent rationale whereby the major aspects of Army development programs can be justified to Congress in terms of thrust, emphasis, and balance.

Increased emphasis on strategic planning, as conducted by aggressive and successful industrial organizations, would offer remedy. Strategic planning should focus on the articulation of "corporate" Army goals, offer alternative strategies to achieve these goals, and define the projections on the driving forces (such as threat evolution, technology, socioeconomic factors) that will shape the environment of the Army in the mid- and long-term futures. The strategic plan (included as part of the RDA Plan) should also address interactions among the Army components, the several Services and potential Allied counterparts, as well as the balance among efforts aimed at maintenance of capability and readiness, as distinguished from innovation. The strategic plan should be explicit in terms of the relationships between the threat projections and the future Army systems to be deployed. It must however, be just as explicit in identifying those systems that are part of the Army's current inventory, but are no longer capable of operating effectively in the evolving future threat environment, or cannot be modified/grown to satisfy the needs of that environment. Finally, the strategic plan should be the tool whereby the Army's future development programs are brought into congruence with the future operational concepts, such as AirLand Battle 2000.

Stimulated by policy directives implementing the Army's strategic plans, the Army Long-Range RDA Plans can serve as a record of mutual commitments between top management and the line and staff organizations. They can also serve as the basis for periodic assessment of achievements versus the proposed objectives and milestones, and thus suggest corrective actions as appropriate. We recommend that the CSA direct that a separate strategic planning section be made part of all Army Long-Range RDA Plans. The outline of such a section should be patterned after those in use by the most aggressive and successful industrial organizations. DCSRDA should be the focal point for the strategic RDA planning. It should see to it that both the "top-down" and the "bottom-up" approaches are reflected in these plans. It is also responsible for including the appropriate elements of strategic planning of other Army elements (e.g., DCSOPS, DCSPER, DCSLOG) that impact the Army's RDA activities.

THE ARMY LONG-RANGE RDA PLAN: FRAMEWORK AND STIMULUS FOR INNOVATION

ISSUE: HOW CAN THE ARMY MODIFY ITS LONG-RANGE RDA PLANNING PROCESS IN ORDER TO SHOW NEED FOR INNOVATION CREATIVITY TO MEET THE EVOLVING THREAT?

DISCUSSION:

- MUCH PROGRESS BY THE ARMY IN THE DEVELOPMENT OF LONG-RANGE PLANNING. HOWEVER, CURRENT RDA PLANS ARE MOSTLY COMBINATIONS OF "BOTTOM-UP" PLANS.
- INTEGRATED, LONG-TERM STRATEGY, INCORPORATING NEW OPERATIONAL CONCEPTS AND THE SYSTEM APPROACH AND INTER-SERVICE RELATIONSHIPS, IS MISSING AND NEEDED.

RECOMMENDATIONS:

- THE CSA TO DIRECT THAT A STRATEGIC PLANNING SECTION BE MADE PART OF ALL ARMY LONG-RANGE RDA PLANS.
- DCSRDA TO BE THE FOCAL POINT FOR STRATEGIC RDA PLANS AND RESPONSIBLE FOR THE BALANCED "TOP-DOWN" AND "BOTTOM-UP" PLANNING.
- THE STRATEGIC RDA PLAN SHOULD:
  - EXPLICITLY SHOW THE RELATIONSHIP BETWEEN SYSTEMS TO BE DEPLOYED AND THE THREAT PROJECTIONS -- PROVIDE FOR BALANCE OF INNOVATION CREATIVITY IN RELATION TO PROGRAM SUPPORT ACTIVITIES.
  - IDENTIFY THOSE SYSTEMS THAT CANNOT BE GROWN OR IMPROVED TO MEET THE PROJECTED THREAT.
  - SHOW HOW PLANS REFLECT FUTURE OPERATIONAL CONCEPTS SUCH AS ALB 2000.

TAKING ADVANTAGE OF SERENDIPITY

Serendipity is the ability, the willingness, and the mental preparedness of people pursuing an objective to derive benefit from ideas and achievements (possibly by others) not originally aimed at that objective. The converse also applies: a given endeavor may lead to unexpected, valuable contributions in areas far remote from the original objectives.

The U.S. Armed Services, and those of the industrially advanced allies, all have development communities supported by their respective contractors and academic counterparts; they encounter technology and operational problems having a large measure of commonality. It is logical to assume that attractive ideas, concepts, solutions to problems will rise in one or several places that have possibly important applications in other areas.

The basic issue is how to improve the Army's attitudes and procedures to encourage the beneficial use of achievements by others.

At the present time, DARCOM and the Army laboratories have little or no incentive to adopt equipment developments from other Services or countries. There are many instances (e.g., AMRAAM, AIM, HVM, HARM, etc.) that offer solutions of potential value to the Army.

The current obstacles to such interorganizational diffusion of ideas are lack of incentives (and strong prevalence of "not invented here" attitudes), lack of communication and, perhaps most important, lack of conscious and sustained leadership drive aimed at improving the situation.

Our recommendations address these points. A reward system should be established or strengthened that will offer tangible incentives to adopt and foster developments by others to achieve Army mission capabilities. At the same time, such a reward system would continuously remind the Army technical personnel of the top-level commitment of top Army management to the idea of exploiting synergy, multiple applications, sharing of technology -- with all the attendant serendipitous opportunities.

DARCOM should take an active hand in reviewing these opportunities, with perhaps an external body, such as the ASB, assessing biannually the process itself and its results ("opportunities") at various levels of completion.

TAKING ADVANTAGE OF SERENDIPITY

ISSUE: DOES THE ARMY EQUIPMENT PROCESS ADEQUATELY CONSIDER DEVELOPMENTS IN PROCESS ELSEWHERE?

DISCUSSION:

- FUNDS AVAILABLE WILL NOT ALLOW ALL WEAPONS SYSTEMS TO BE OPTIMIZED FOR SINGLE-PURPOSE APPLICATION.
- ARMY LABORATORIES TODAY HAVE LITTLE INCENTIVE TO TIE ARMY APPLICATION TO DEVELOPMENTS ONGOING IN OTHER SERVICES OR COUNTRIES.
- AMRAAM, AIM, HVM, HARM, ETC., - ALL REPRESENT SYSTEMS ON WHICH ARMY CAN BUILD.
- THE ARMY NEEDS A WAY TO ENSURE AN EVEN-HANDED REVIEW OF THESE OPPORTUNITIES.

RECOMMENDATIONS:

- AN APPROPRIATE REWARD SYSTEM MUST BE MADE EVIDENT FOR ADOPTION OF DEVELOPMENTS OF OTHERS.
- REQUIRE DARCOM TO REVIEW OPPORTUNITIES FOR USE OF DEVELOPMENTS BY OTHERS.
- ASK ASB TO BIENNIALLY REVIEW BOTH PROCESS AND OPPORTUNITIES.

AFFORDABILITY

There are many ways that advanced technology can be used to drive down costs of the total Army as a system. Order of magnitude improvements in system reliability would have a major impact on the maintenance approach to diagnostics, the size and structure of the maintenance organization, the logistic system and approach, and maintenance training. Technology advances in vehicle propulsion and smart weapons would greatly reduce POL and ammunition requirements, thereby radically enhancing the strategic and tactical mobility of the Army. Advances in manufacturing technology would clearly have a major impact on acquisition costs. Technology can also be used to design less manpower-intensive systems.

More attention is needed to help focus the Army's technology efforts in those areas that have the potential for driving down total Army costs. Total system costs must cover the total cost to the Army of acquiring, deploying, operating, and maintaining the system including the major functional elements of the Army such as logistics, transportation, and training. An important starting point for making progress is the determination of total system cost estimates for Army combat or combat support systems. The purpose is clearly to identify the cost drivers that could serve to focus the technological efforts in the areas of major potential impact. In addition, these total system costs can provide the incentive and basis for trade-offs of Army system affordability goals and performance goals by TRADOC rather than just trade-offs of acquisition affordability goals and performance goals.

More front-end money must also be spent in system development to assure that system designs are producible before the system designs are fixed. This implies a specific trade-off between system performance and producibility early in a development program.

A major way to drive down costs is to procure commercial equipment (sometimes with minor modification). Certainly the technology developments of the so-called information explosion are driving costs down rapidly. Capabilities exist that were never thought possible before – and with the rapid decreases in cost, such capabilities are becoming affordable. Opportunities are not limited to the electronics area but they are most dramatic in that area.

AFFORDABILITY

ISSUE: HOW CAN TECHNOLOGY BE USED TO DRIVE DOWN THE COST OF THE TOTAL ARMY SYSTEM, INCLUDING DEVELOPING, PRODUCING, DEPLOYING, AND MAINTAINING ALL ITS WEAPON SYSTEMS AND EQUIPMENT?

DISCUSSION:

- INSUFFICIENT ATTENTION HAS BEEN GIVEN TO USING HI-TECH TO DRIVE DOWN COSTS OF THE TOTAL ARMY AS A SYSTEM.
- HEAVY EMPHASIS ON DRIVING DOWN COST THROUGH SOPHISTICATED USE OF TECHNOLOGY WAS IMPORTANT PART OF GOALS SET FOR FIVE THRUSTS; REDUCE PEOPLE, AMMO, POL.
- FIRST-CLASS, UP-FRONT SYSTEM DESIGN FOR MAKING RELIABLE EQUIPMENT IS NECESSARY.

RECOMMENDATIONS:

- DARCOM TO REVIEW CAPABILITY TO SUPPORT PROGRAMS USING TECHNOLOGY TO LOWER OVERALL SYSTEM COSTS, INCLUDING DEVELOPING, PRODUCING, DEPLOYING, AND MAINTAINING ALL ITS WEAPONS SYSTEMS AND EQUIPMENT.
- DCSRDA REQUIRE TOTAL SYSTEM COST ESTIMATES TO INCLUDE IDENTIFICATION OF COST DRIVERS TO FOCUS TECHNOLOGY.
- ASSURE TRADOC REQUIREMENTS REFLECT A TRADE-OFF OF AFFORDABILITY GOALS AND PERFORMANCE GOALS.
- DARCOM COMMIT ADEQUATE RESOURCES TO PRODUCIBILITY OF NEW SYSTEMS DURING FEASIBILITY/EXPLORATORY DEVELOPMENT STAGES TO INCLUDE REINFORCED MANUFACTURING RESEARCH AND MANUFACTURING METHODS AND TECHNOLOGY (MM&T) PROGRAMS.
- USE COMMERCIAL SPECIFICATIONS IN PLACE OF MIL SPECS AND COMMERCIALLY AVAILABLE EQUIPMENT (WITH MINOR MODIFICATION) WHEREVER POSSIBLE.

ARMY/DARPA INTERACTION

For many years, a large segment of the DARPA (then ARPA) program was directed to ballistic missile defense (BMD), clearly a program of Army interest. With the transfer of the BMD technology program to the Army in the late 60's, however, the proportion of DARPA resources committed to Army programs dropped significantly and today makes up only 8 percent of the DARPA program (cf. p. 76). The reasons for this are not clear, but it does appear that DARPA's priority orientation is toward strategic problems with the concomitant perception that the conventional land battle is of low priority.

This is not to say that DARPA has not been concerned about Army problems. It has, and has applied significant resources to their solutions; for example, the liquid propellant gun, the electromagnetic gun, ASSAULT BREAKER, etc. Nevertheless, the resources applied to developments of Army interest are far less than those applied to developments oriented to Navy and Air Force interests. Furthermore, there is some evidence of a negative relationship between DARPA and the Army in regard to the applicability of the several developments cited. Until recently, there has been little serious interest in these developments on the part of the Army "user" organization, TRADOC. It is well established that lack of "user" interest in a new development seriously prejudices its likelihood for success.

The Chief of Staff has recently called for a review and assessment of this situation with a view to increasing DARPA interest in and support of developments addressed to land combat. We applaud that initiative and urge that follow-up actions be pursued. A strong first step in this direction would be to increase the number of Army officers assigned to the DARPA staff. A longer range step toward improving DARPA awareness of and interest in land combat problems could come from establishing a mechanism whereby DARPA could participate in and contribute to the operations of the Integrated Land-Air Warfare Development Group (ILAWDG) once it is organized and functioning effectively. Not only would DARPA learn more about Army problems, but DARPA experts could contribute technologically to ILAWDG activities. Increased interaction between Army and DARPA could increase the probability that DARPA technology developments would be compatible with advanced Army tactical and equipment concepts and therefore would result in adoption by the Army.

ARMY/DARPA INTERACTION

ISSUE: HOW TO FOCUS DARPA MORE EFFECTIVELY ON ARMY PROBLEMS?

DISCUSSION:

- DARPA PRIORITY TOWARD STRATEGIC JOINT PROBLEMS; DARPA DOES NOT PERCEIVE A HIGH NATIONAL PRIORITY ON CONVENTIONAL LAND BATTLE.
- DIFFICULTY IN RELATING ARMY TECHNOLOGY THRUSTS PROGRAMS TO HIGH-RISK, HIGH-PAYOFF TECHNOLOGY ISSUES.
- DIFFICULT TO INSPIRE ARMY OFFICERS TO WANT TO COME TO DARPA.

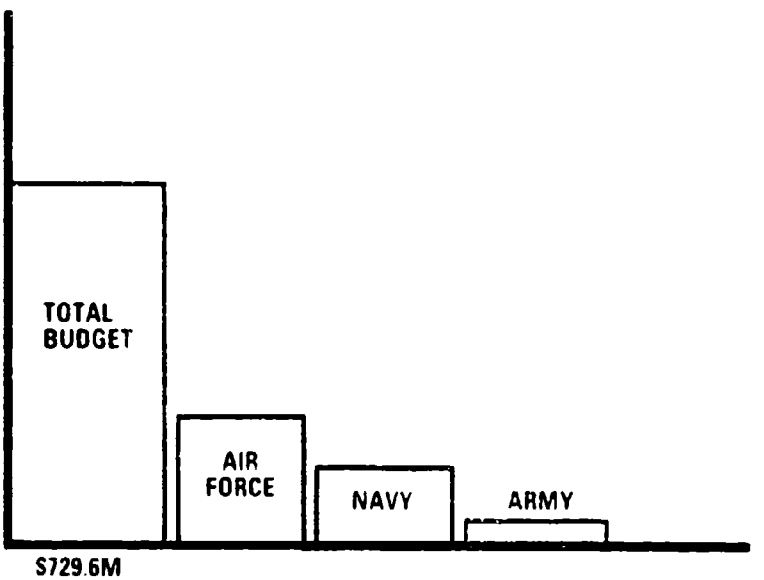
RECOMMENDATIONS:

- THE ARMY TAKE POSITIVE ACTION TO INCREASE TO 10 THE NUMBER OF ARMY OFFICERS ASSIGNED TO DARPA -- MAKE IT A CAREER PLUS.
- ENSURE EFFECTIVE PERMANENT ARMY DARPA INTERFACES TO CHANNEL DARPA'S EFFORTS INTO DIRECTIONS POTENTIALLY CRITICAL TO THE ARMY.
- SENIOR ARMY MANAGEMENT (UNDER SECRETARY AND VCSA) WORK WITH SENIOR OSD MANAGEMENT TO GET REPRESENTATIVE PROGRAM -- FOLLOW AND EXTEND RECENT CHIEF OF STAFF INITIATIVE.
  - INCLUDING WORKING RELATIONSHIP WITH INTEGRATED LAND-AIR WARFARE GROUP.

DARPA PROGRAMS – SERVICE SUPPORT

The data presented below are for FY1983 – – and clearly show the unacceptable state of current Army/ DARPA relationships. Useful interactive programs have been generated; but further efforts are urgently required to effect a more equitable distribution of funds.

DARPA PROGRAMS
SERVICE SUPPORT
FY 1983



SUMMARY LIST OF KEY RECOMMENDATIONS

Many recommendations -- all believed to be important -- have been made in this section relating to equipping the Army in the spirit of the Future Development Goal. The key recommendations, summarized below, could in our opinion have a major, salutary effect on the Army of the future.

We must also emphasize that (again, in our opinion) the indicated priority areas require urgent attention if the Army is to achieve its objectives for the future. There may be ways to accomplish those objectives other than those outlined in the recommendations of this report -- but immediate attention and action are needed.

SUMMARY LIST OF KEY RECOMMENDATIONS

- ESTABLISH AN INTEGRATED LAND-AIR WARFARE ACTIVITY - TREAT ARMY AS A SYSTEM.
- EXPAND MISSION OF ADEA TO INCLUDE HTTB ACTIVITIES OF A HEAVY DIVISION.
- EXPAND ALTERNATIVE FASTER TRACK ACQUISITION PROCEDURES FOR HIGH-LEVERAGE SYSTEMS.
- CHANGE TOP MANAGEMENT OF KEY LABORATORIES, IF WEAK.
- ASSURE THAT THE LONG-RANGE RDA PLAN EFFECTIVELY REFLECTS THE GOALS AND OBJECTIVES OF THE ARMY.
- ESTABLISH A REWARD SYSTEM THAT ENCOURAGES THE ADOPTION AND UTILIZATION OF THE DEVELOPMENTS OF OTHERS.
- EXPLOIT TECHNOLOGICAL OPPORTUNITIES FOR GREATLY REDUCING ARMY TOTAL SYSTEM COSTS.
- TAKE ACTION TO GET DARPA RESOURCES FOCUSED ON ARMY PROBLEMS.

FUTURE DEVELOPMENT

GOAL

MANNING AND TRAINING

MANNING AND TRAINING – PRIORITY AREAS CONSIDERED

On the following pages, discussions and recommendations relative to Manning and Training are presented in accordance with the outline shown below.

PRIORITY AREAS CONSIDERED BY MANNING AND TRAINING PANEL

- HOW TO NURTURE INNOVATION
  - CREATING ENVIRONMENT
  - OER PROCESS CHANGES
  - R&D LABORATORY CHANGES
- INNOVATIVE INITIATIVES IN MANNING/TRAINING
  - MODERNIZE TESTING/TRAINING METHODS
  - EXPLOIT HUMAN TECHNOLOGY
  - SOLDIER IN SYSTEM DESIGN
  - COMPUTER LITERACY

CREATING ENVIRONMENT

A scientific understanding of innovation is only loosely established; scientific literature does not provide an unambiguous set of fundamentals to guide in the development of an environment for innovation. There has been extensive research and case work applied to this area; e.g., by the National Science Foundation (NSF), university business schools, and industry, but there has been no synthesis of results.

Nevertheless, there are some principles that are widely accepted. Many are artfully espoused in Peters and Waterman, "In Search of Excellence." Among the principles endorsed are: the role of leadership in creating values that influence behavior, mission-type directives that allow subordinates freedom to choose their own methods of accomplishment and a high degree of experimentation (i.e., "cut and try") with tolerance for concomitant failures that provide the learning that leads to success.

Despite the lack of a solid theoretical base, practicing consultants have successfully applied selected results of both research and case studies to help organizations promote innovation. Accordingly, it is recommended that the Army pursue this course of action and use consultant resources (ARI or others).

Army leaders (officers and NCO's) must be convinced that innovation is important to the Army and to their careers. Establishing and sustaining this cultural change will require careful planning. Reinforcing actions must be taken periodically to ensure that Innovation doesn't "gradually fade away."

The Army can begin to encourage innovation using pilot programs, seminars, management training, and other techniques demonstrated in industrial and civilian organizations. This approach should begin with top-down leadership and direction. Techniques for generating innovative behavior must be understood and applied. The Army system could accomplish this by including appropriate subjects in the Program of Instruction (POI).

Finally, new ideas, no matter how good, cannot be implemented if there are no resources to do so. Small amounts of discretionary funds are needed down to the battalion level to give local commanders the means for experimenting.

CREATING ENVIRONMENT

ISSUE: HOW TO CREATE ENVIRONMENT FOR INNOVATIVE BEHAVIOR.

DISCUSSION:

- THE ARMY NEEDS INNOVATION AND INGENUITY AT ALL LEVELS, BUT THERE ARE NO PROGRAMS TO UNDERSTAND INNOVATION OR TO ENCOURAGE IT.
- LEADERS CREATE VALUES AND INFLUENCE BEHAVIOR, BUT IN ENVIRONMENT OF CHANGING DOCTRINE AND EQUIPMENT THEY MAY NOT FEEL COMFORTABLE IN ALLOWING SUBORDINATES FREEDOM TO INNOVATE.
- CULTURAL CHANGE CAN BE PROMOTED BY:
  - EMPHASIS ON "WHAT" NOT "HOW" ORDERS TO ENCOURAGE INNOVATION.
  - A SCHOOL APPROACH WHICH OFFERS OPPORTUNITY TO INNOVATE.
  - EXPECTING AND ACCEPTING OCCASIONAL FAILURES.
  - FORUM-TYPE NETWORKING TO STIMULATE EXCHANGE OF INNOVATE CONCEPTS.
  - PROVIDING REINFORCEMENT NEEDED TO SUSTAIN INNOVATION.

RECOMMENDATIONS:

- ARI UNDERTAKE MAJOR EFFORT TO UNDERSTAND INNOVATION. HOW TO RECOGNIZE IT, REWARD IT, PROTECT THOSE WHO ENCOURAGE IT.
- CSA ESTABLISH A PLAN OF SPECIFIC ACTIONS OVER A PERIOD OF TIME TO REINFORCE INNOVATION.
- DCSOPS ASSURE DISCRETIONARY FUNDS ARE PROVIDED TO UNITS TO ENCOURAGE EXPERIMENTATION.
- TRADOC SCHOOLS (OFFICER AND SENIOR NCO) AND WAR COLLEGE TEACH TECHNIQUES FOR ENHANCING INNOVATION.

OER PROCESS CHANGES

The objective is to establish innovation as a permanent value within the Officer Corps. The Officer Efficiency Report (OER) is key in defining values and attaching benefit to conformance with those values. The inclusion of innovation as an OER element could probably be the single most important and lasting means for causing it to become accepted as a desirable, sought-after professional characteristic.

There are other means which should be adopted to complement inclusion in the OER. Nearly as important is the identification of a number of officer assignments which clearly demand an incumbent who can create an environment conducive to innovation, then making those positions comparable to command positions in terms of their attractiveness to ambitious professionals. It is also essential that such positions be seen as desirable steps in the officer career path.

Formal recognition for innovation is also important. Medals, citations, cash awards, prizes, local publicity will encourage greater effort and emulation by others. Some combination of these should be used to support innovation as desirable behavior at all levels within the Army.

OER PROCESS CHANGES

ISSUE: THE OFFICER EFFICIENCY REPORTS (OER'S) MUST RECOGNIZE INNOVATIVE PROFESSIONAL ACTIVITY AS A CAREER DEVELOPMENT FACTOR.

DISCUSSION:

- A VERY IMPORTANT INFLUENCE ON AN OFFICER IS THE OER.
- PURSUING INNOVATIVE IDEAS AND ACTIVITIES PRESENTLY RISKS REJECTION/FAILURE AND ADVERSE EFFECT ON OER.
- LEADERS MUST DEMAND AND CREATE ENVIRONMENT WHICH ENCOURAGES, RECOGNIZES, AND REWARDS (ESPECIALLY ON OER) INNOVATIVE ACTIVITIES.

RECOMMENDATIONS:

- DCSPER DEVELOP PROCEDURES IN OER PROCESS TO INCREASE INCENTIVES FOR INNOVATION.
- AS PART OF ARMY'S REVIEW OF OPMS, DCSPER DEVELOP VARIOUS OTHER MEANS OF ENCOURAGING INNOVATION, SUCH AS:
  - MAKING THOSE ASSIGNMENTS WHICH DEMAND INNOVATION A DESIRABLE STEP IN CAREER DEVELOPMENT.
  - CREATING FORMAL RECOGNITION FOR INNOVATION IN THE FORM OF MEDAL(S) OR OTHER AWARDS.

R&D LABORATORY CHANGES

Numerous studies over the years have concluded that the Army laboratories are not providing the R&D necessary for rapid technological advancement. Various solutions have been suggested. In general, the problems appear to be inadequate leadership, inability to attract first-rate personnel to the Civil Service, inability to reward excellence, inadequate facilities, poor self-image, instability of funding, external micro-management, and limited discretionary funds. The constraints of the current system have not allowed significant departure from ongoing practices. Several statements from the "Hermann Report" are:

> "The salary constraints of government employment, escalating industry salaries, increasing bureaucratic administrative burdens in the laboratories, and other factors are causing a loss of work force competence . . .
>
> "The procurement policies, procedures, and practices forced on the laboratories by legislation and regulation cause an excessive investment in nonproductive activities and are so burdensome and counterproductive that innovation is greatly constrained . . .
>
> "The facilities and, in many cases, the laboratory equipment are outdated, inefficient, and in need of replacement . . .
>
> "The laboratories seem to be working on the wrong problem from either viewpoint of technology opportunities or operational needs."

While we recognize that certain Army laboratories are competent, we believe a number of approaches should be tried to improve the laboratories because of the urgency of the situation. We believe that immediate action should be taken to replace the management of the weaker laboratories. We urge that implementation of the ASB 82 Summer Study on S&F be continued. As a third item many of the members feel that the Secretary of the Army should designate two Army laboratories as test-beds for implementing a civil sector management approach to providing innovative laboratories. These laboratories would be turned into contractor GOCOs outside the Civil Service. In recommending the GOCO approach, we are fully aware of the political and other obstacles to its achievement.

There are several examples of laboratories changing from Civil Service to contractor operated. Two more recent ones were the DOE Bartlesville and Laramie Laboratories, which were changed to contractor-operated facilities. The contractor-run organizations could be modeled after successful laboratories such as the Jet Propulsion Laboratory, Applied Physics Laboratory, and the DOE Weapon Laboratories. Freedom could be allowed to create an innovative atmosphere and build first-rate R&D establishments. Realistic evaluation of progress and success could be provided by an advisory group of academic, industrial, and military scientists and engineers. If a successful process were achieved, it could then be applied gradually to some of the other laboratories.

The results of the various paths of improvement could be compared and used to guide further actions.

R&D LABORATORY CHANGES

ISSUE: ARMY MANAGEMENT URGENTLY NEEDS TO DEVELOP ENVIRONMENTS THAT ENCOURAGE INNOVATION AND PRODUCTIVITY IN R&D LABORATORIES.

DISCUSSION:

- THE HERMANN USDRE REPORT STATES THAT WHILE "...MUCH GOOD WORK IS BEING DONE IN THE MILITARY LABORATORIES...." THERE IS ..."A LOSS OF WORK FORCE COMPETENCE" AND "...INNOVATION IS GREATLY CONSTRAINED." OTHER REPORTS REACH SIMILAR CONCLUSIONS (PACKARD, ASB 82 SUMMER STUDY ON S&E, NATIONAL RESEARCH COUNCIL).
- ARMY IS TAKING REMEDIAL ACTIONS BUT IS HAMPERED BY BUREAUCRATIC CONSTRAINTS COMPARED TO CIVILIAN SECTOR.
- R&D REQUIREMENTS FOR ALB 2000 DEMAND AGGRESSIVE ACTION BY THE LABORATORIES.
- IMPORTANCE OF ISSUE JUSTIFIES IMPLEMENTATION OF MULTIPLE APPROACHES TO IMPROVEMENTS.

RECOMMENDATIONS:

- DARCOM TAKE IMMEDIATE ACTION TO CHANGE MANAGEMENT FOR THOSE LABORATORIES THAT ARE WEAK.
- ARMY CONTINUE TO IMPLEMENT ASB 82 SUMMER STUDY ON S&E FOR ALL LABORATORIES.
- MANY STUDY GROUP MEMBERS FEEL THAT THE SECRETARY OF THE ARMY SHOULD DESIGNATE TWO ARMY LABORATORIES TO TEST CIVIL SECTOR MANAGEMENT APPROACHES TO PROVIDING INNOVATIVE LABS.
  - TURN LABORATORIES INTO GOCOs REMOVE PERSONNEL FROM CIVIL SERVICE,
  - PROVIDE ADEQUATE DISCRETIONARY FUNDS,
  - PROVIDE ADVISORY GROUP TO JUDGE BEFORE AND AFTER

MODERNIZE TESTING/TRAINING METHODS

The Army is moving to a high-technology, information-rich, fast-moving battlefield. There is a need to use current technologies to select and allocate individuals to meet these changing requirements.

The personnel testing methods which are used by the Army are largely based on theories developed during the first half of this century and do not include recent research results or take advantage of electronic technology. There is limited measurement of the psychomotor skills needed to use modern information systems-based equipment.

Several aspects of current testing need modernization. The AFQT and ASVAB, for example, are largely tests of cognitive functions and tend to "select out" effective individuals with manual dominance. Psychomotor skills which are particularly important in many military tasks are not taken into account in personnel testing. In fact, psychomotor skill standards are not established for each MOS.

Testing techniques should be automated and adaptive to a greater extent. Tests can be developed to assess psychomotor and specialized abilities for MOS-specific tasks.

Resulting automated testing should not only be cheaper, less time-consuming to use, but would have the capability of being rapidly changed to meet changing requirements. This would facilitate their distribution to the unit level for monitoring weekly/monthly personnel progress and readiness. Thus they could provide both centralized and decentralized MOS skill level inventories and master files to be used in manning and training decisions. This could also help meet a key, pervasive need of both the Reserves and the National Guard.

Exciting, highly leveraged technologies applicable to training are now available; e.g., computer-based instruction. The hardware/software technology is coming of age in industry, making it possible both to improve the effectiveness of training and to move training from the schoolhouse to the unit. This could change the training philosophy from centralized, large, fixed-site facilities and simulators to distributed training using portable, part-task trainers and job aids. There have been demonstrations of the use of advanced training technology in the Army, but the current progress in this technology justifies more aggressive programs.

To increase the utilization of such technology, the Army needs to establish demonstration programs in schools and units, using advanced training technology for actual training. The Army needs to move to implement the recommendations of the 1982 DSB Summer Study Report on Training and Training Technology.

This technology can well be a major vehicle for aiding the Army's Active/Reserve/Guard division of labor and for facilitating full mobilization doctrine.

MODERNIZE TESTING/TRAINING METHODS

ISSUE: NEED TO MODERNIZE MEASUREMENT OF INDIVIDUAL ABILITIES TO LEARN, MAINTAIN SKILL LEVELS, AND PERFORM JOBS.

DISCUSSION:

- RECENT DISCOVERIES PROVIDE OPPORTUNITIES TO IMPROVE BASIC TESTING AND ASSESSMENT TECHNIQUES, ESPECIALLY IN THE IMPORTANT AREAS OF PSYCHOMOTOR AND DECISIONMAKING SKILLS.
- USE OF MICROELECTRONICS CAN IMPROVE TESTING, ASSESSMENT, AND TRAINING THROUGH:
  - AUTOMATED AND ADAPTIVE TESTING (ASVAB) AND ASSESSMENT (SQT).
  - LOW-COST, PORTABLE, PART-TASK TRAINERS.
  - AFFORDABLE COMPUTER-BASED INSTRUCTION.
- MICROELECTRONICS CAN GREATLY FACILITATE EXPORTABILITY OF ASSESSMENT, TRAINING, AND SKILL MAINTENANCE SYSTEMS TO FIELD UNITS AND TO RESERVE AND GUARD.
- SOLDIER-ORIENTED R&D (INCLUDING TRAINING DEVICES AND SIMULATORS) IS LESS THAN 2% OF 6.1, 6.2, 6.3 BUDGETS

RECOMMENDATIONS:

- DCSPER ESTABLISH ARMY-WIDE PROGRAM OF ADVANCED TESTING AND ASSESSMENT TECHNOLOGY, EXPAND CURRENT R&D, AND INITIATE PILOT PROGRAMS. DISTRIBUTE PROVEN TECHNIQUES WORLDWIDE DOWN TO UNIT LEVEL AND TO THE RESERVE AND GUARD.
- TRADOC AND FORSCOM EXPAND PLANNED TRAINING TECHNOLOGY TEST BEDS FOR CBI AND PART-TASK TRAINERS AND IMPLEMENT PROVEN TECHNOLOGY ARMY-WIDE.
- FUTURE ARMY SYSTEMS SHOULD CONTAIN EMBEDDED CAPABILITY FOR TRAINING AND SKILL MAINTENANCE.

EXPLOIT HUMAN TECHNOLOGY

The Army should emphasize "Human Capital" as a major source of growth in effectiveness. Strategies and actions are now in development and demonstration which indicate substantial prospects to improve human capacity or potential. There is significant anecdotal and experimental evidence of performance improvements in such areas as: accelerated learning, sleep control/stress management, physical endurance, cohesion technology, high-performance programming.

Several new techniques in unit training in cohesion have been developed in centers for specialized training. The III Corps has a special program in this area being conducted at Fort Hood, Texas.

High-Performance Programming is a specialized training strategy for achieving excellence in teams and organizations. Techniques are used to develop organizations progressively from reactive to responsive, to high performance modes. High-performance programs have been used in both commercial and military development workshops. Over 100 General Officers and SES personnel have taken the workshop.

Cohesion technology is a related human technology which takes a holistic approach to integrating physical, intellectual, psychological, and value-based components of soldier behavior. It is designed to pull together the physical capabilities and individual characteristics/traits/behaviors involved in sustained high performance.

The techniques are typically unconventional and without an established scientific basis, but there are some indications of impressive results. A number of questions remain regarding the effectiveness of these new and unconventional human technology approaches. DCSPER should continue to support current test-bed and pilot programs as an efficient and rapid method to validate these techniques for general application in the Army. Without slowing down ongoing initiatives in the field, DCSPER should initiate supporting R&D programs with ARI and WRAIR. We endorse the recommendations of the letter on "Emerging Concepts in Human Technology" by General George S. Blanchard (USA–Ret.)

DA DCSPER should act to formally integrate/coordinate ongoing Army efforts to adopt human technology, to encourage continued exploration, to facilitate evaluations, and support follow-on efforts. DA DCSPER/TRADOC should establish a formal survey procedure to identify available technologies and sponsor a R&D program jointly executed by ARI and WRAIR to evaluate emerging technology and to develop supporting data and tools. Integration of efforts and R&D programs should be conducted in parallel and should not be allowed to slow current operational developments.

EXPLOIT HUMAN TECHNOLOGY

ISSUE: HOW TO EXPLOIT HUMAN TECHNOLOGY EFFORTS UNDERWAY IN INDUSTRY AND THE ARMY.

DISCUSSION:

- HUMAN TECHNOLOGY CAN IMPROVE INDIVIDUAL AND TEAM PERFORMANCE (COHESION TECHNOLOGY, HIGH-PERFORMANCE PROGRAMMING....).
- THERE IS ANECDOTAL EVIDENCE OF PERFORMANCE IMPROVEMENT USING A VARIETY OF TECHNIQUES.
- INITIATIVES ARE SCATTERED AMONG ARMY ORGANIZATIONS.

RECOMMENDATIONS:

- DA/DCSPER FIND WHAT WORKS IN PRIVATE SECTOR AND ARMY. BROADEN APPLICATION TO THE ARMY.
- DA/DCSPER/TRADOC SURVEY TECHNOLOGIES AND SPONSOR SELECTED R&D PROGRAM JOINTLY BY ARI AND WRAIR.
- DA/DCSPER/TRADOC/SSC CONTINUE TO FOSTER CURRENT EFFORTS WITH APPROPRIATE OVERSIGHT.
- THE ARMY SHOULD EXERCISE CAUTION - IT WILL BE EASY TO LOSE A GOOD THING BECAUSE OF ADVERSE PUBLICITY OR POLITICAL PRESSURE.

SOLDIER IN SYSTEM DESIGN

Personnel and hardware parameters need to be given equal weight in the system development process. There is top-level concern over more effective integration of personnel and training factors into this process. However, there is no established methodology to achieve this total systems development. The Army needs to identify the specific actions and interfaces required to integrate soldier performance capabilities and limitations into system development over the entire acquisition process.

A one-time management exercise is recommended with the objective to identify/validate/refine the requisite manpower, personnel, and training interfaces with hardware. The ASAS system could be used for this exercise. Lessons learned could be generalized for subsequent use in major systems acquisition. The overriding concern is the need to identify critical interfaces and milestones required to integrate manning and training factors into the acquisition process.

In designing future systems or PIPing current systems, computer technology can be exploited to solve personnel-related problems. In weapon systems with embedded computers, training and assessment can be built into the system. Thus, the system itself could be used to provide initial training and maintain skills for both the operators and maintainers. The proficiency of system personnel could be assessed on-line and remedial training provided in the unit. Embedded training and assessment could be added to currently fielded systems using strap-on computers. This approach could be used to address some difficulties now being encountered in recently fielded systems. PIPs should continue to be used to simplify operation and maintenance of fielded systems.

SOLDIER IN SYSTEM DESIGN

ISSUE: HOW TO DESIGN HARDWARE TO MATCH THE OPERATOR CAPABILITIES.

DISCUSSION:

- PERSONNEL PARAMETERS NEED TO BE GIVEN EQUAL WEIGHT IN DESIGN WITH HARDWARE PARAMETERS.
- COMPUTER TECHNOLOGY CAN BE EXPLOITED TO ADDRESS PERSONNEL-RELATED OPERATIONS EQUIPMENT.
- HOW TO INTEGRATE PERSONNEL AND TRAINING WITH MODERN HARDWARE NOT UNDERSTOOD.

RECOMMENDATIONS:

- VCSA DIRECT A ONE-TIME MANAGEMENT EXERCISE BY DARCOM/DCSPER TO IDENTIFY "HOW TO" INTEGRATE PEOPLE INTO PROCESS.
  - APPLY TO SYSTEM IN EARLY STAGE OF DEVELOPMENT (E.G., ASAS).
  - INCLUDE PM/TSM AND ARMY STAFF PRINCIPALS.
  - DEVELOP LESSONS TO BE USED ON OTHER PROGRAMS.
  - HAVE IG PROVIDE EVALUATION OF LESSONS LEARNED AND HIGHLIGHT DISCONNECTS.
- DARCOM SHOULD EXPLOIT OPPORTUNITY FOR CONTINUOUS OPERATOR TRAINING AND SCORING BY USING EMBEDDED/STRAP-ON COMPUTERS DELIVERED WITH OPERATIONAL EQUIPMENT.
- DARCOM CONTINUE PIPs TO SIMPLIFY OPERATION OF FIELDED SYSTEMS.

COMPUTER LITERACY

The socioeconomic environment that soldiers now come from is experiencing an evolutionary and revolutionary thrust into the computer/information age. Ready access to ADP equipment coupled with the software and telecommunications explosion are the infrastructure of the emerging information age.

To assure that the Army leads in the information revolution, DCSOPS should initiate a program of experiments. First, the Army must promote personal computers as a professional tool for military personnel and make it easier for such personnel to acquire these "tools" of their trade. To facilitate this, the Army General Counsel should apply for an IRS ruling recognizing the personal computer as a professional tool and arrange for the advantages of purchase through GSA.

Secondly, TRADOC should direct the OE school to implement the proposed Systems Integration Network linking all Force Integration Cells in the Divisions. Lessons learned from the 1970s Delta Net can be applied with 1980s technology to demonstrate the power of computer networks to meet Army needs.

Thirdly, the Army needs to facilitate GO/SES exploitation of the information revolution by making this technology a non-threatening aspect of their job. The Combined Arms Center should implement a GO/SES network as a technique for distributing current information and facilitating collegial problem-solving.

DCSOPS should publicize successes of innovative uses of personal computers and payoffs of computer literacy in MOS performance.

COMPUTER LITERACY

ISSUE: HOW TO OBTAIN AND MAINTAIN PERSONNEL PROFICIENCY IN COMPUTER TECHNOLOGY.

DISCUSSION:

- COMPUTER HARDWARE SOFTWARE AND TELECOMMUNICATIONS SYSTEMS ARE THE INFRASTRUCTURE OF THE COMPUTER INFORMATION AGE.
- FAMILIARITY WITH COMPUTER-BASED EQUIPMENT AND PROCEDURES WILL PROMOTE INNOVATION IN THE ACHIEVEMENT OF ARMY GOALS.

RECOMMENDATIONS:

- DCSOPS INITIATE EXPERIMENTAL PROGRAMS.
  - ALL ARMY PERSONNEL - GENERAL COUNSEL FACILITATE PERSONAL ACQUISITION OF PERSONAL COMPUTERS THROUGH OBTAINING FAVORABLE IRS AND GSA RULINGS.
  - ACTION OFFICERS - OE SCHOOL ESTABLISH A "MODEL" NETWORK LINKING FORCE INTEGRATION CELLS IN THE DIVISIONS.
  - GO SES - THE COMBINED ARMS CENTER ESTABLISH MODEL COMPUTER NETWORK FOR GO SES USE IN TRADOC TO EXCHANGE INFORMATION ON COMBAT DEVELOPMENTS ISSUES.
  - DCSOPS EXPLORE THEIR PROGRAMS COOPERATIVELY WITH OTHER SERVICES TO FAMILIARIZE MILITARY WITH BENEFITS OF COMPUTER.
  - DCSOPS PUBLICIZE EXAMPLES OF SUCCESSES IN AREAS ABOVE.

GENERAL ISSUES

THIS COMPLETES OUR LIST OF DETAILED RECOMMENDATIONS ON INNOVATION ON HOW TO FIGHT, HOW TO EQUIP, AND HOW TO MAN.

THERE ARE, HOWEVER, SOME GENERAL ISSUES THAT ARE IMPORTANT. IT IS WITH THESE THAT I WILL CONCLUDE.

IN THE END AS IN THE BEGINNING, THE ARMY IS PEOPLE AND IT IS LEADERSHIP.

WE NEED GOOD PEOPLE. WE NEED ENOUGH PEOPLE. WE NEED WELL-ORIENTED PEOPLE AND WE NEED MOTIVATED PEOPLE.

TO THAT END. . . . . .

SUPPORT OF PEOPLE

ISSUE: THE ARMY GENUINELY BELIEVES IN SUPPORT OF ITS PEOPLE. BUT IN THE ARMY, OSD, AND CONGRESS, OUR PEOPLE ISSUES DO NOT GET STRONG ENOUGH SUPPORT TO ALLOW US TO COMPETE WELL FOR THE YOUNG PEOPLE WE NEED.

DISCUSSION:

- FOR THE MODERNIZATION OF THE ARMY AND FOR FLEXIBILITY IN THE FIELD, INNOVATIVE, WELL-TRAINED SOLDIERS ARE DESPERATELY NEEDED.
- PEOPLE PROGRAMS DO LESS WELL THAN HARDWARE PROGRAMS. WE DO NOT YET GAIN ENOUGH FINANCIAL SUPPORT FOR SOLDIER NEEDS (HOUSING, FAMILY TOGETHERNESS, WORK ENVIRONMENT).
- WHEN GOOD TIMES COME AND THE DEMOGRAPHIC SHORTAGE SHOWS UP, THE ARMY MUST BE ABLE TO COMPETE WELL FOR THE YOUNG PEOPLE AVAILABLE.
- THE BEST WAY TO GET NEEDED PRIORITY FOR ALL OF ITS PEOPLE PROGRAMS IS TO START AT THE TOP AND CONTINUE TO PUT TIME TO IT.

RECOMMENDATIONS:

- FOR A ONE-YEAR PERIOD, REVIEW MONTHLY INNOVATIVE PEOPLE PROGRAMS WITH THE SA, CSA, AND THE USofA, THE VCSA, AND THEIR STAFFS.
- IN THIS WAY GET SOME STEAM BEHIND PEOPLE ISSUES. DON'T LET THE PIZZAZZ OF ALB 2000 OBSCURE THE FUNDAMENTAL NEED FOR GOOD PEOPLE AND THE DIFFICULTY OF THE TIMES AHEAD.

SUPPORT FOR 1982 SUMMER STUDY ON S&E PERSONNEL

In respect to people issues, this year's Summer Study also strongly supports the recommendations of the 1982 Summer Study on Science and Engineering Personnel.

It is recognized that some follow-up action has been taken, that general support for the study has been stated, and that some of the recommendations are difficult to implement. It is believed, however, that further attention and additional emphasis are needed to exploit in a timely way the significant ideas of this important study.

SUPPORT FOR 1982 SUMMER STUDY ON S&E PERSONNEL

ISSUE: THE FINDINGS OF THE 1982 ASB SUMMER STUDY ON SCIENCE AND ENGINEERING PERSONNEL HAVE YET TO RECEIVE STRONG FORMAL ENDORSEMENT BY THE ARMY.

DISCUSSION:

- THE ARMY FACES A FUTURE OF EVER-MORE-COMPLEX TECHNOLOGY AND EVER-MORE-INTERACTIVE SYSTEMS AND TACTICS.
- AIRLAND BATTLE 2000 INTRODUCES SPECIAL NEEDS FOR QUALITY PERSONNEL
- SS 82 ON S&E PERSONNEL PROVIDED SIGNIFICANT RECOMMENDATIONS RELATING TO:
  - MILITARY RDA MANAGEMENT AND MATERIEL MAINTENANCE.
  - CIVILIAN S&E RESOURCES.
  - UNIVERSITY AND INDUSTRY RESOURCES.
  - NATIONAL "TECHNOLOGICAL LITERACY."
- PROGRESS HAS BEEN MADE TOWARD CONSIDERATION/IMPLEMENTATION OF THE RECOMMENDATIONS - BUT ADDITIONAL EMPHASIS SEEMS NEEDED

RECOMMENDATIONS:

- THIS 1983 SUMMER STUDY ON THE FUTURE DEVELOPMENT GOAL STRONGLY URGES THE ARMY TO IMPLEMENT RECOMMENDATIONS OF THE 1982 SUMMER STUDY ON S&E PERSONNEL.

USE OF MILITARY HISTORY TO PROMOTE INSIGHT

It is the Army's practice to record history -- and to do an excellent job in that regard.

But we seem in general to ignore the insight that could be achieved through a concerted effort to derive lessons from history -- lessons that might help to provide perspective for the future. Great leaders and tacticians of the past have urged attention to history in this respect; it is an especially important time for us to respond.

USE OF MILITARY HISTORY TO PROMOTE INSIGHT

ISSUE: THE ARMY IS EMBARKING ON NEW OFFENSIVE TACTICS WITH GREATLY INCREASED SMALL-UNIT FLEXIBILITY. LESSONS OF HISTORY CAN BRING ADDITIONAL UNDERSTANDING OF THIS FUTURE BATTLEFIELD. WE DO NOT HAVE A STRONG PROGRAM TO EXTRACT THESE LESSONS OF HISTORY.

DISCUSSION:

- NAPOLEON/PATTON/BRADLEY/EISENHOWER ALL ENDORSED UNDERSTANDING OF MILITARY HISTORY AS IMPORTANT TO MODERN COMBAT.
- BECAUSE WE CANNOT DUPLICATE CONDITIONS OF FEAR ON OUR TEST RANGES, WE CANNOT WITH CERTAINTY SIMULATE THE EFFECT OF OUR NEW OFFENSIVE TACTICS.
- STUDY OF MILITARY HISTORY MAY MAKE FOR INCREASED UNDERSTANDING OF NEW ARMY TACTICS AND POSSIBLE RESPONSES OF ADVERSARIES TO THEM.
- OUR PRESENT HISTORY PROGRAMS PRIMARILY RECORD COMBAT HISTORY AND DO NOT PROJECT ITS LESSONS.

RECOMMENDATIONS:

- THE HISTORIAN OF THE ARMY SHOULD FUND REVIEWS AND STUDIES OF THE IMPACT OF OFFENSIVE TACTICAL INNOVATION ON THE BATTLEFIELDS OF THE PAST.
- THESE REVIEWS AND STUDIES SHOULD THEN BE PUBLISHED AND DISSEMINATED WITHIN THE ARMY.
- AS A SUITABLE BODY OF MATERIAL BECOMES AVAILABLE, COURSES SHOULD BE INTRODUCED INTO THE APPROPRIATE MILITARY SCHOOLS.

IN CONCLUSION

THIS ASB TASK FORCE HAS NOW COMPLETED ITS PRESENTATION TO YOU, THE ARMY'S SENIOR MANAGEMENT, OF ITS SPECIFIC RECOMMENDATIONS. ALTHOUGH THESE RECOMMENDATIONS MAY APPEAR UNRELATED, THEY DO HAVE A COMMON THEME.

WE, THIS ASB PANEL, SUGGEST THAT THERE MUST BE A SIGNIFICANT CHANGE IN THE ARMY R&D PROCESS INCLUDING A STRONG LOGISTICS R&D TO SUPPORT ITS FUTURE DEVELOPMENT GOALS. NOW THAT MOST OF THE R&D FOR TODAY'S MAJOR EQUIPMENT REDESIGN CYCLE HAS BEEN COMPLETED, THERE MUST BE A STRONG SHIFT TO HARDWARE AND PEOPLE AND SUPPORT PROGRAMS WHICH ALLOW USE OF THIS NEW EQUIPMENT IN A FLEXIBLE OFFENSIVE-MINDED WAY AND TO THOSE PROGRAMS FOR WHICH EQUIPMENT IS NEEDED TO MEET THE FULL INTENT OF ALB 2000.

OUR NATIONAL HERITAGE HAS BEEN ONE OF INITIATIVE AND INNOVATION. OUR EQUIPMENT NOW PERMITS MUCH GREATER FLEXIBILITY IN ITS INDIVIDUAL PERFORMANCE. HOWEVER, EXTRACTING THE GREATEST FORCE POTENTIAL FROM WHAT WE HAVE IS LIMITED BY OUR COMPARATIVELY LOW-LEVEL EFFORT TO UNDERSTAND HOW BEST TO PUT IT ALL TOGETHER. NEW HARDWARE, PEOPLE, AND TACTICS PROGRAMS TO ACHIEVE FLEXIBLE FORCE INTEGRATION HAVE JUST STARTED.

WE STRONGLY ENDORSE THIS FINE START, AND WE URGE THAT YOU SUSTAIN AND GROW IT. WE BELIEVE IN THE NEEDED DEVELOPMENT PROCESS OF ALB 2000 BUT WARN THAT IT WILL REQUIRE MUCH INNOVATION IN ALL ASPECTS OF OUR ARMY. WE WISH YOUR SUSTAINED GOOD LUCK.

"ORGANIZATIONS CREATED TO FIGHT THE LAST WAR BETTER ARE NOT GOING TO WIN THE NEXT."

LIEUTENANT GENERAL JAMES M. GAVIN

WE BELIEVE FUTURE GENERATIONS OF AMERICANS WILL BE PROUD OF THE FORWARD LOOK OF TODAY'S ARMY AND THAT NO ONE WILL HAVE CAUSE TO BELIEVE THAT ITS GENERALS IN THE LATE 80'S AND 90'S PREPARED FOR THE LAST WAR.

HOWEVER, WE DO NOT BELIEVE THE ARMY YET REALIZES THE FULL DIMENSIONS OF INNOVATIVE CHANGE NECESSARY TO IMPLEMENT THE FLEXIBLE, MANEUVER-ORIENTED, OFFENSIVE-MINDED FORCE IT SEEKS.

THE ARMY WILL, IF IT PERSISTS, REACH ITS GOAL - EVENTUALLY. HOW FAST IT REACHES THIS GOAL DEPENDS ON THE OPEN-MINDEDNESS AND INNOVATION OF THE PEOPLE IN THIS ROOM. IT ALSO DEPENDS ON YOUR ABILITY TO PROMULGATE TO THE REST OF THE ARMY AN ENVIRONMENT THAT CAN ENCOURAGE INNOVATION.

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

14 JAN 1983

Dr. Richard A. Montgomery
Director of Corporate Development
R&D Associates
Post Office Box 9695
4640 Admiralty Way
Marina del Ray, California 90291

Dear Dr. Montgomery,

I ask that you appoint an Army Science Board Panel of 10-15 members to conduct a Summer Study examining the Army's Future Development Goal.

The Chief of Staff and Secretary of the Army have established seven Total Army Goals as the basis for assuring the continued successful accomplishment of the Army's traditional mission: to act as a deterrent to any attack upon U.S. national interests and, if deterrence fails, to engage and defeat any enemy in any environment.

The Future Development Goal's expanded definition suggests that the Army's view should cover the full spectrum of warfare and maintain a much broader perspective than the traditional development area of materiel acquisition. Innovative approaches are sought in functional areas of doctrine, force structure, manning, training, equipping and mobilizing. Indeed, an examination of the trends in the Army's Long Range Plan will show that new approaches will be mandatory to maintain a modern, effective Army within foreseeable cost constraints.

As you are aware, Dr. Sculley and I have agreed to make the Army's Future Development Goal the theme of a Summer Study in 1983. My views of the objectives of this study are (1) to develop ideas as to how the Army can nurture an environment at all levels within which innovative personnel can look toward the future, and (2) to make a fresh assessment of where the Army should be headed in all of the above listed functional areas in the 21st century. Although I would not want you to neglect consideration of the entire force, it is my view that the more severe challenge to attainment of our future development goals is the light component of our forces, which must be as effective as the heavier counterparts and survivable while at the same time strategically deployable.

The ASB's most recent Summer Studies, of 1980, 1981 and 1982, concentrated on specific aspects of the Army's Future Development goals. I believe this Summer Study should build on, where useful, the prior work, and take a broader total view of the integrated set of viable goals and actions to be initiated to achieve those goals.

This objective is intentionally broad. We do not want the ASB effort to be constrained by The Future Development Goal ideas and strategies already expressed in earlier briefings or in various memoranda. I see implementation of The Future Development Goal as a long term proposition. In that regard, we may well continue the ASB effort beyond the conclusion of the Summer Study.

The group should begin its efforts no later than 1 March 1983, with some group and possibly sub-group meetings over the next six months, culminating in a two week summarization and writing session, probably in August. LTG James Merryman is the DA sponsor of the study. He has designated LTC(P) Jack O'Reilly (ODCSRDA) as the DA Staff Assistant.

Dr. Marvin Lasser and BG Joe Breedlove (ODCSRDA) have agreed to serve as senior staff advisors, and Colonel Rik Erkelens will serve as the cognizant Deputy from my office.

Sincerely,

Amoretta M. Hoeber
Principal Deputy Assistant Secretary of the Army
(Research, Development and Acquisition)

ACRONYMS

2ER/1ED
2nd Echelon Regiments of the 1st Echelon Division

ADA
Air Defense Artillery

ADEA
Army Development and Employment Agency

ADP EQUIPMENT
Automatic Data Processing Equipment

AFSAB
Air Force Scientific Advisory Board

AFQT
Armed Forces Qualification Test

AI
Artificial Intelligence

AIM
Air Intercept Missile

ALB
AirLand Battle

ALB 2000
AirLand Battle 2000

ALF
AirLand Force

AMMO
Ammunition

AMOPS
Army Mobilization and Operation Planning System

AMRAAM
Advanced Medium Range Air-To-Air Missile

AMSAA
Army Material Systems Analysis Agency

APL
Applied Physics Laboratory

AR 70-1
RDA Management
Dated 1 May 1976

ARI
U.S. Army Research Institute
for Behavioral and Social Sciences

ARSTAF PERSONNEL
Army Staff Personnel

ARTBASS
Army Training Battle Simulation System

ASAS
All Source Analysis System

ASB
Army Science Board

ASVAB
Armed Services Vocational Aptitude Battery

BAI
Battlefield Air Interdiction

BMD
Ballistic Missile Defense

BRASS 2000
Battlefield Robotic Ammunition Supply System

C&D
Cover and Deception

C²
Command and Control

C³
Command, Control, and Communication

ACRONYMS (Cont'd)

CAA
Concepts Analysis Agency

CAMIS
Continental Army Management Information System

CAS
Close Air Support

CBI
Computer Based Instruction

CBR
Chemical, Biological, Radiological

CBRS
Concept-Based Requirements System

CECOM
Communication Electronics Command

CEWI
Combat Electronic Warfare Intelligence

CG
Commanding General

CIV
Civilian

CM
Countermeasures

CNO
Chief of Naval Operations

CPX
Command Post Exercise

CS
Combat Support

CSA
Chief of Staff Army

CSAF
Chief of Staff Air Force

CSS
Combat Service Support

CSS/LOG
Combat Service Support/Logistics

CSWS
Corps Support Weapon System

DA
Department of the Army

DARCOM
Army Material Development and Readiness Command; Headquarters

DARPA
Defense Advanced Research Projects Agency (Formerly ARPA)

DC3I
Distributed Command, Control, Communications, and Intelligence

DCSLOG
Deputy Chief of Staff for Logistics

DCSOPS
Deputy Chief of Staff for Operations and Plans

DCSPER
Deputy Chief of Staff for Personnel

DCSRDA
Deputy Chief of Staff for Research, Development and Acquisition

DOD
Department of Defense

DOE
Department of Energy

ACRONYMS (Cont'd)

EAC
Echelons Above Corps

EMCON
Emission Control

EW
Electronic Warfare

FEBA
Forward Edge of Battle Area

FM100-5
Operations (How to Fight)
August 1982

FOG-M
Fiber Optic Guided Missile

FORSCOM
Forces Command

FTX
Field Training Exercise

GAMP
Guided Anti-Armor Mortar Projectile

GNP
Gross National Product

GO/SES
General Officer/Senior Executive Service

GOCO
Government Owned Contractor Operated

GSA
General Services Administration

HARM
High-Speed Antiradiation Missile

HMMWV
High Mobility Multipurpose Wheeled Vehicle

HQUSAF
Headquarters, United States Air Force

HTLD DISTRIBUTED CP
High Technology Light Division
Distributed Command Post

HTTB
High Technology Test Bed

HUMINT
Human Intelligence

HVM
Hyper-Velocity Missile

ID
Infantry Division; Identification

IG
Inspector General

ILAWDG
Integrated Land-Air Warfare Development Group

IOC
Initial Operational Capability

IRS
Internal Revenue Service

JPL
Jet Propulsion Laboratory

JSTARS
Joint Strategic Targeting and Reporting System

JTACMS
Joint Tactical Munitions Systems

LOC
Lines of Communication

LOG CENTER
Logistics Center

ACRONYMS (Cont'd)

LPI
Low-Probability-of-Intercept

LRP
Long Range Planning; Long Range Patrol

MAA
Mission Area Analysis

MACOM'S
Major Commands

MIL
Military

MIL SPECS
Military Specifications

MILES
Multiple Integrated Laser Engagement System

MLRS
Multiple Launch Rocket System

MM&T
Manufacturing Methods and Technology

MOS
Military Occupational Specialty

MOU
Memorandum of Understanding

NCO'S
Non-Commissioned Officers

NOTT
New Organization Training Team

NSA
National Security Agency

NSF
National Science Foundation

NTC
National Training Center

OASA(RDA)
Office Assistant Secretary of the Army
Research, Development and Acquisition

ODCSRDA
Office Deputy Chief of Staff
Research, Development and Acquisition

OER
Officer Efficiency Report

OPFOR
Opposing Forces

OPM
Officer Personnel Management

ORSA
Operations Research Systems Analysis

OSD
Office of the Secretary of Defense

PPI
Pre-planned Product Improvements

PIP
Product Improvement Program

PM/TSM
Project Manager/TRADOC System Manager

POI
Program of Instruction

POL
Petroleum, Oils, and Lubricants

POM
Program Objective Memorandum

ACRONYMS (Cont'd)

R&D
Research and Development

RDA
Research, Development and Acquisition

RDTE
Research, Development, Test and Evaluation

RPV
Remotely Piloted Vehicle

S&E
Science and Engineering

SA
Secretary of the Army

SCM
Self-Contained Munitions

SES
Senior Executive Service

SIGINT
Signal Intelligence

SMI
Soldier-Machine Interface

SOTAS
Standoff Target Acquisition System

SQT
Specialty Qualification Tests

SS 79
1979 ASB Summer Study on
Technology Planning for Future Fielded Systems,
July 1979

SS 80
1980 ASB Summer Study on
Statistical Techniques in Army Testing,
July 1980

SS 81
1981 ASB Summer Study on
Equipping the Army 1980-2000,
Volume I, Executive Summary, and Volume II
August 1981

SS 82
1982 ASB Summer Study on
Science and Engineering Personnel,
November 1982

SSC
Soldiers Support Center

SWC
Special Warfare Center

TAC
Tactical Air Command

TACOM
Tank Automotive Center, Warren, Michigan

TGSM
Terminally Guided Submunition

TNF
Theater Nuclear Forces; Tactical Nuclear Forces

TRADOC
Training and Doctrine Command

TRASANA
TRADOC System Analysis Activity

US of A
Under Secretary of the Army

USAF
United States Air Force

USAREUR
U.S. Army Europe

ACRONYMS (Cont'd)

USN
United States Navy

VINTI2
Vehicle Integrated Intelligence

VCSA
Vice Chief of Staff of the Army

VHSIC
Very High Speed Integrated Circuit

VISTA
Very Intelligent Surveillance and Target Acquisition

VLSIC
Very Large Scale Integrated Circuit

WRAIR
Walter Reed Army Institute of Research

WWMCCS
Worldwide Military Command and Control System

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